GIS APPLICATION TO RURAL PLANNING IN TEHRI GARHWAL DISTRICT

A DISSERTATION

Submitted in partial fulfilment of the requirements for the award of the degree of

MASTER OF URBAN AND RURAL PLANNING

By

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FEBRUARY, 2003

CERTIFICATE

Certified that this report titled **"GIS Application to Rural Planning in Tehri Garhwal District"**, which has been submitted by **Mr. Hitesh Kumar**, in partial fulfillment of the requirements for the award of Post Graduate Degree in **Master of Urban and Rural Planning** in the Department of Architecture and Planning, Indian Institute of Technology Roorkee, Roorkee, is the student's own work carried out by him under my supervision and guidance. The matter embodied in this dissertation has not been submitted for the award of any other degree.

Date: 28th Feb 2013

Place: Roorkee

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CANDIDATE'S DECLARATION

I hereby declare that the work, which is presented in this dissertation entitled **"GIS APPLICATION TO RURAL PLANNING IN TEHRI GARHWAL DISTRIST"** in partial fulfillment of the requirements for the award of degree of **Master of Urban and Rural Planning,** submitted in the **Department of Architecture and Planning, Indian Institute of Technology Roorkee, Roorkee,** is an authentic record of my own work carried out for a period of about seven months from August 2002 to February 2003 under the supervision of **Prof. R. Shankar,** Professor, Department of Architecture and Planning, IIT Roorkee, Roorkee.

The matter embodied in this dissertation has not been submitted by me for award of any other degree.

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This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

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ACKNOWLEDGEMENT

One of the most pleasant part of writing a dissertation report is the opportunity to thank who contributed to it, Unfortunately the list of expression of thanks, no matter how extensive, is always incomplete and inadequate. These acknowledgements are not exceptions.

It is a great pleasure for me to express my deep sense of gratitude and heartiest thanks to **Prof R. Shankar,** *Professor, Department of Arcitecture and planning, Indian Institute of Technology Roorkee, Roorkee,* for his valuable guidance, persistent encouragement, motivation, support and spontaneous help through out the dissertation work. It was an honorable and great experience for me to work under him.

I also express my sincere gratitude to **Dr. Najamuddin,** *Prof. and Head of the Department, Department of Architecture and Planning, IIT Roorkee, Roorkee,* for his support during the dissertation work and providing the facilities of the department.

I convey my sincere gratitude to all government, semi-government and other organizations that helped me in data collection all the time.

I am also thankful to my seniors, classmates and juniors for their persistent encouragement, help and support, right from the beginning of the work.

Last, but not the least, I am grateful to my parents for their love, inspiration, support and faith in me.

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Dedicated to my Parents,

Faith & friendship

ABSTRACT

In a developing country like India where 73% of the population resides in rural area and 27% in urban areas, we need a very structured planning procedure such that the development activities and infrastructure facilities are available at both urban and rural area. However, in such a condition where majority of people live in rural area and are provided with the least infrastructure facilities, creates a regional imbalance in development, causing shift in population from rural to urban areas. Hence administrators or decision-makers require an efficient GIS based tool, which will assist them to get the updated scenario of the region.

The present study emphasizes the power of GIS technology which will help the state government of Uttaranchal to better understand and evaluate spatial data by creating graphic displays using information stored in the database. As GIS does more than just display the data; it enables the user to dynamically analyze and update the information linked to those locations spatially and can further strengthen the e-governance.

Tehri Garhwal district is taken as a case study covering all the 9 blocks with 1760 villages. The administrative maps were digitized and non-spatial attribute data, prepared on MS-Excel, were incorporated to each of the villages in spatial data. In the present study two prime parameters –Primary facilities and secondary facilities are taken as a model to demonstrate the GIS based e-governance. The purpose of this study is to locate existing Primary and secondary facilities and indicate upgradation /new creation of such facilities require as per the norms. The objectives of the present study are:

- To provide the planners an accurate spatial view of the district at different levels such as district, block and village level as well as road, rail and drainage network etc.
- To provide the planners detailed demographic infrastructure related data on desktop in a GIS environment.
- To assists the planners in finding out the possible locations for such facilities depending on concerned parameters such as for health; population, no. of health centers required and its optimum location, no. of disease infected persons etc. in a village.

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Chapter 1 INTRODUCTION

1. GENERAL:

India is a country where more than 70% of our population lives in the rural environment. Overall progress of the country is reflected by the development of both, rural and urban environments. In fact the socio-economic condition of the rural inhabitants has a direct impact on the food and environment of the urban eco-society. Since our rural inhabitants are mainly dependent upon primary activities, like agriculture, on which our whole developmental planning depends, we have to sincerely look into the problems of the rural areas. In such a vast and diverse country like India, the studies carried out in some particular area or village and the suggestions given may not be applicable in some other rural region since there are differences in their physical and socio-economic settings and conditions. [1]

Since Independence, efforts has been being made to evolve an infrastructure for the development of the poor rural society through various developmental plans starting from the First Five Year Plan to the ninth Five Year Plan by the Planning Commission. In the First and Second Five Year Plans, emphasis was laid on community development and the National extension plan while in the Third Five Year Plan emphasis was given to agriculture through various programmes under district level planning viz. Intensive Agricultural District Programme (IADP), Intensive Agricultural Area Programme (IAAP) etc. In the Fourth and Fifth Five Year Plans the focus was on both district level planning and regional planning. During Sixth Flan, block level development plans were aimed at, under the Intensive and Integrated Rural Development Programme. However, the desired results could not be achieved and the programmes could not do justice to the rural poor. [6]

Looking at the above, the question still remains as to what changes are required in the sub-regional planning process and what shall be the structure and content of development plan at the district and sub-regional levels.

In existing District/sub-regional development plans and plan reports we see the following short comings:

- Spatial references to planning problems are uncommon at the micro level.
- Spatial references to interrelated problems are either absent or inadequate.
- Interrelationship between planning problems and environmental resource conditions are spatially not depicted.
- Therefore, spatial reference to locally available resources and their potentials is not made in the effort to solve/overcome developmental problem.
- For the plan executing agency or implementing official at district level (District Magistrate/ Collector) spatial reference, within the environmental context, to planning problems is very important and useful but it is not there.
- In spite of 73rd constitution amendment, the village Panchayats, Gram Sabhas and Nyaya Panchayats prevailing at the village level are not involved in plan making and implementing process. It is reflected in the absence of devolvement of village level information and planning. (See Appendix I)

Geographical Information System is one such tool that can provide the exact spatial reference to various planning problems and potentials of existing resources and help in analyzing problems in their environmental context. There is a need for proper use of GIS in sub-regional planning.

2. ROLE OF GIS IN PLANNING:

GIS technology has been traditionally associated with the mapping and management of natural resources, including forests, from the inception of its use some twenty-five years ago. Canada was one of the first countries in the world to make use of a large GIS for natural resource management as well as other purposes. The uses to which GIS technology has been put in managing natural resources are well illustrated by some of the uses it has in forest management and forestry. [7]

At the present time, it can be truly said that GIS techniques produce maps, which are equal to, or superior to those produced by manual means. The evidence for this is the number of governmental and commercial cartographic organizations, which are going over to GIS approaches to map production.

Because GIS technology, when combined with Database Management System (DBMS) technology and with various data gathering techniques, makes it much easier to create and maintain comprehensive information about natural and man-made resources, many issues, which were not approached systematically in the past because the data were too costly to gather or the analysis too time consuming, are now being addressed explicitly. Instead of having to identify, fund, and staff a special study for each new problem, the existence of GIS makes it much easier to deal with special problems by means of query and reporting efforts not too much different from other kinds of routine management operations. **[2]**

What remains to be seen, in this area of GIS application as in all others, is the extent to which GIS technology can do more than just help organize and rationalize policy making, decision making and management, important as that would be if it were accomplished. What remains to be seen, and what is potentially most important about GIS technology, is whether GIS technology can make an important contribution to the solution of the problems which have been sketched out about; in short, whether GIS technology can make a difference in natural and man-made resources management, which is what planning for regional and sub-regional development is all about.

3. IDENTIFICATION OF THE PROBLEM:

Newly constituted Uttaranchal State is known for its unique heritage, unique environmental resources and picturesque setting. Due to human cohabitation of natural ecosystems, the hill districts of the State have become melting pots of complex issues of development. The development complexity calls for not only comprehensive planning data right from village level but necessitates identification of problems based on these real data and involvement of the people from village level upwards both in the decision making process and implementation of development schemes/ projects. The implementation of 73rd and 74th amendments provides the appropriate setting for this. Above all, there is urgent need to make the planning and implementing process flexible, interactive, easy to understand and field oriented. Appropriate application of GIS can make rural regional planning what it should be.

4. AIM AND OBJECTIVES:

4.1. Aim:

Aim of this dissertation is "To demonstrate the use of GIS in rural planning in the Himalayan State of Uttaranchal through the case study of Tehri Garhwal District".

4.2. Objectives:

With the aim in view, the following set of objectives has been framed in this investigation for this study. They are:

1. To study and prepare GIS based planning maps at the state and district levels of Uttaranchal.
2. To study and map the available environmental resources and infrastructure facilities in terms of their qualitative and quantitative potentialities at the district, and block level of Tehri Garhwal district in order to have an environmental resource database.
3. To analyze, spatially, the data base at the block level for identification of key planning problems and priorities
4. To identify and prioritize planning problems at village level using GIS.
5. To formulate guidelines for rural planning using GIS.

5. SCOPE:

The study primarily involves review of present system of hill area development to outline ways and means so that the needs and aspirations of the people synchronize with the available resources with them. The data for present investigation are collected from both primary and secondary sources.

The present investigation aims to study the major environmental resources of the study area for which data is easily available, on one hand, and to evolve a suitable planning model based on these environmental resources on the other. It is hoped that if proposed planning model is implemented systematically, it would result in the optimized use of available funds and regional environmental resources besides making the planning and implementing process easier for people concerned.

6. LIMITATIONS:

The present investigation has limitations, such as, short time period and very little human and financial resources. As a result, fulfilling the goals is a tall order. Moreover only readily available planning data at the district, block and village level is used, which may not be most accurate. Individual village studies are limited to select Nyaya Panchayat villages. (See Appendix II, III)

7. ANALYTICAL TOOLS AND TECHNIQUES:

The data related to present investigation has been processed by using Microsoft Office and Excel Packages for data collection and Adobe Photoshop Package for maps and image analysis and interpretation. Resources base studies, for both spatial (maps) and non-spatial (numeric) data have been analyzed by making use of ArcView GIS (Geographical Information System) software.

8. RESEARCH METHODOLOGY:

Methodology adopted to fulfill the objectives as identified earlier, covers the following stages:

1. Literature survey including case studies carried of similar exercise to draw relevant inferences;
2. Study of environmental resources of the region (district), its potential and utilization;
3. Preparation of spatial and non-spatial Database and linking them;
4. Analysis of the data using GIS tools and techniques;
5. Identification of problems of the study area;
6. demonstration of GIS application in the planning process for rural development;
7. Recommendations and conclusions.

The methodological sequence as emerged from the methodology adopted has been depicted diagrammatically in the flow chart (figure 1.1)

RESEARCH METHODOLOGY:

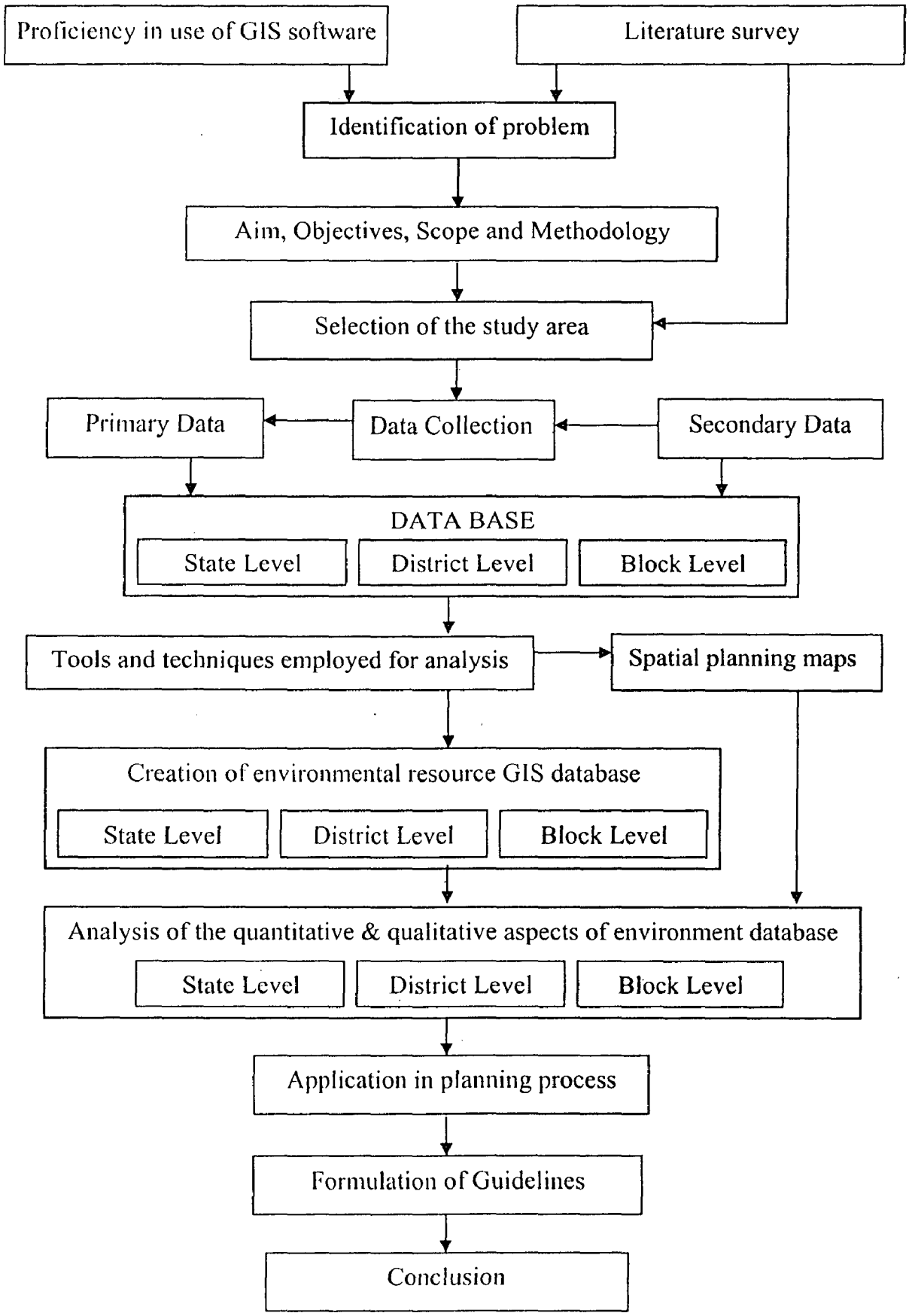


Figure 1.1: Research Methodology

PART I: GIS AND ITS ROLE IN REGIONAL PLANNING

2.1. GENERAL:

The identification of areas having identical environmental resource problem is a primary task for suggesting the future plans for overall development of a region. Geographical Information System can efficiently be utilized for delineation of physically and environmentally similar areas. Because GIS technology, when combined with Database Management System (DBMS) technology and with various data gathering techniques, makes it much easier to create and maintain comprehensive information about the region.

2.2. GIS BASED PLANNING DATABASE:

The design and creation of large environmental database is important not only for global change studies but also for sustainable development. These databases are used for planning measures such as education, public awareness and participation, resource management/ development and the application of environmental technologies etc. Planners and decision makers have high expectation of the GIS hardware/ software systems which are now commercially available. The utility of GIS has been on the rise of late with the availability of a large number of commercial GIS packages in the market. Application of GIS for resource management and decision-making is limited only by the imagination of how to combine the different data sets. Many times new ideas create the need for even more data so as to achieve the end goal. This has been matched by a significant increase in the information retrieval capabilities of GIS. It is because of this fact that GISs are now becoming widely popular and are being used for a wide range of application.

2.3. GIS APPLICATION IN REGIONAL PLANNING:

The stress on developmental planning is that it should be able to Project regional and local in physio-geographical endowment and the social characteristics of the people involved, and thus bring out the total perspective of the region. This calls for an integrated plan involving the assessment of the existing levels of physical, economic and social resources of the region and their spatial distribution, and then estimating future needs of the various

resources in the region based on the resource potential and the existing pattern. [3]

For effective planning and development, a variety of data on and natural resources, human resources, social practices and economic aspects are required. It calls for preparing an exhaustive database on natural and man-made resources and identification of priorities in implementations strategies. This is made possible by the application of GIS. It also needs an holistic approach through an understanding of various interdependent factors of ecology. The integrated approach is a comprehensive action programme aimed at optimal realization of resource potential in light of the physical, economical, social and other development goals. Such an endeavour entails harmonious development of land, water, vegetation and other resources of a region in sustainable manner, so that the changes proposed to meet the needs of development are brought out without diminishing the potential for their future use;

2.4. GEOGRAPHIC DATABASE:

A GIS does not hold maps or pictures- it holds a database. The database concept is central to a GIS and is the main difference between a GIS and a simple drafting or computer mapping system, which can only produce good graphic output. All contemporary GIS's incorporate a database management system. [9]

If we want to go beyond just making pictures, we need to know three pieces of information about every feature stored in the computer - what it is, where it is and how it relates to other features (e.g. which road link to form a contd. network). Database systems provide the means of storing a wide range of such information and updating it without the need to rewrite programs as new data is entered. [8]

Essentially, a GIS gives us the ability to associate information with a feature on a map and to create new relationships that can determine the suitability of various sites for development, evaluate environmental impacts, calculate harvest volumes, identify the best location for a new facility, and so on.

2.5. GIS: AN OVERVIEW:

GIS is a system of computer hardware and software designed to allow users to collect, manage and analyze large volumes of spatially referenced data and associated attributes. Because GIS technology allows analysts to process and interrelate, many more kinds of data that were previously infeasible, GIS users have the potential to greatly improve traditional missions, such as data collection, research, assessment, and information delivery. [5]

THUS, a GIS is not simply a computer system for making maps, although it can create maps at different scales, in different projections and with different colors. A GIS is an analysis tool. ***The major advantage of a GIS is that it allows the user to identify the spatial relationships between map features.*** [5]

A GIS does not store map in any conventional sense; nor does it store a particular image or view of a geographic area. Instead, a GIS stores the data from which a user can create the desired view drawn to suit a particular purpose.

A GIS links spatial data with geographic information about a particular feature on a map. The information is stored as attributes or characteristics of the graphically represented feature. For example, a road network might be represented by road centerlines, in which case, the actual visual representation of the road wouldn't yield much information about it. To obtain information about the road, such as its width or type, the user could query the database. Then the user could create a display symbolizing the roads according to the type of information that needs to be shown.

2.6. PHILOSOPHY OF GIS:

The proliferation of GIS is explained by its unique ability to assimilate data from widely divergent sources, to analyze trends over time, and to spatially evaluate impacts caused by development. For an experienced analyst, GIS is an extension one's own analytical thinking. The system has no in-built solutions for any spatial problems; it depends upon the analyst.

The importance of different factors of GIS in decreasing order is as under:

Spatial Analysis / Database / Software / Hardware

GIS involves complete understanding about patterns, space, and processes or methodology needed to approach a problem. It is a tool acting as a means to attain certain objective quickly and efficiently. Its applicability is realized when the user fully understands the overall spatial concept under which a particular GIS is established and analyses his specific application in the light of those established parameters.

Before the GIS implementation is considered the objectives, both immediate and long term, have to be considered. Since the effectiveness and efficiency (i.e. benefit against cost) of the GIS will depend largely on the quality of initial field data captured, organizational design has to be decided upon to maintain this data continuously. This initial data capture is most important.

2.7. QUESTIONS A GIS CAN ANSWER:

We can distinguish a GIS from other computer drafting systems by listing the types of questions it can (or should be able to) answer. If we stand back far enough from a particular application, we can see that there are five generic questions that a sophisticated GIS can answer. [8]

Location What is at....?

The first of these questions seeks to find out what exists at a particular location. A location can be described in many ways using, for example, place name, posts or zip code, or geographic references such as latitude and longitude.

Condition Where is it....?

The second question is the converse of the first and requires spatial analysis to answer. Instead of identifying what exists at a given location, we want to find a location where certain conditions are satisfied (e.g., an unforested section of land at least 20,000 square meters in size, within 100 meters of a road, and with soils suitable for supporting buildings).

Trends What has changed since....?

The third question might involve both of the first two and seeks to find differences within an area over time.

Patterns What spatial patterns exist?

This question is more sophisticated. Someone might ask this question to determine whether cancer is a major cause of death among residents near a nuclear power station. Just as important, someone might want to know how many anomalies there are, that don't fit the pattern and where they are located.

Modeling What if....?

"What if...." questions are posed to determine what happens, for example, if a new road is added to network or if a toxic substance seeps into the local groundwater supply? Answering this type of question requires both geographic and other information (and possibly even scientific laws).

Aspatial Questions

"What's the average number of people working with GIS in each location?" is an aspatial question - the answer to which does not require the stored value of latitude and longitude; nor does it describe where the places are in relation with each other.

Spatial Questions

"How many people work with GIS in the major centres of Delhi?" OR "Which centres lie within 10 Kms. of each other? ", OR " What is the shortest route passing through all these centres?". These are spatial questions that can only be answered using latitude and longitude data and other information such as the radius of earth. Geographic Information Systems can answer such questions.

2.8. COMPONENTS OF A GIS:

Geographic Information Systems have ***three important components Computer hardware, sets of application software modules, and a proper organizational context including skilled people***, which need to be in balance if the system is to function satisfactorily. **[20]**

2.8.1. Computer Hardware:

The computer hardware includes a hard disk drive for storing data and programs, a digitizer or scanner for converting maps and documents into digital form so that they can be used by the computer programs, a plotter or a printer or any kind of display device, to present the results of the data processing. Inter-computer communication is provided by

local and global electronic networks using special lines with optical fibers or over ordinary telephone lines by using `modem'. The user controls the computer and the peripherals via the computer screen and keyboard, aided by a `mouse' or pointing device. (FIG. 2.1)

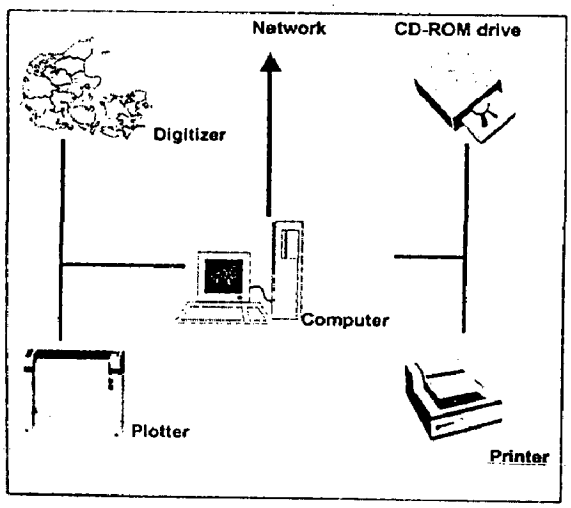


Figure 2.1

2.8.2. GIS Software:

The software for a geographical information system may be split into five functional groups (FIG. 2.2)

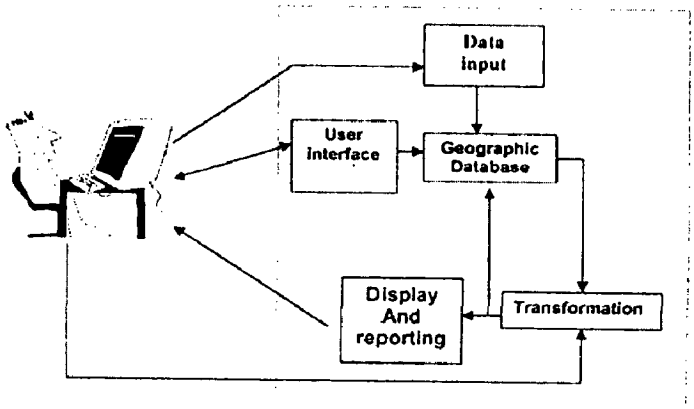


Figure 2.2

2.8.2.1. Data input and verification: Data input covers all aspects of capturing spatial data from existing maps, field observations and sensors (including aerial photography, satellites and recording instruments) and converting them to a standard digital form. Many tools are available including, the digitizer, word processors and spreadsheet programs, scanners (in satellites or airplanes for direct recording of data or for converting maps and photographic images) and devices necessary for reading data already written on magnetic tapes and the verification of data. (FIG. 2.3)

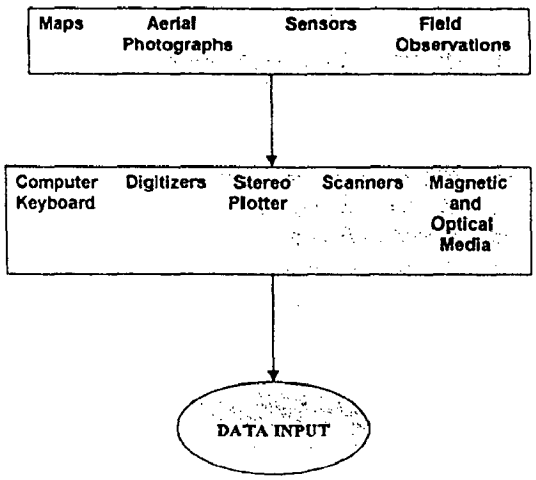


Figure 2.3

2.8.2.2. Data storage and database management: Data storage and management concerns the way in which data about the location, linkages (topology) and attributes of geographical elements (points, lines, poligons) are structured and organized, both with respect to the way they must be handled in the computer and how they are perceived by the users of the system. ***The computer program used to organize the database is known as a Database Management Systems (DBMS).*** (FIG. 2.4)

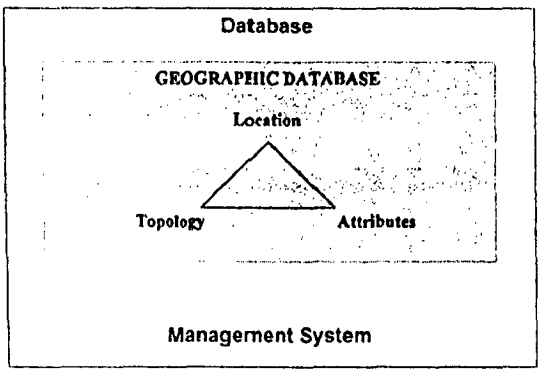


Figure 2.4

2.8.2.3. Data output and presentation: It concerns the ways the data are displayed and how the results are displayed and how the results of analysis are reported to the users. Data may be presented as maps, tables and figures (graphs and charts) in a variety of ways ranging from an ephemeral image on the computer screen, through hardcopy of output drawn on printer or plotter to information recorded on magnetic media in digital form. (FIG. 2.5)

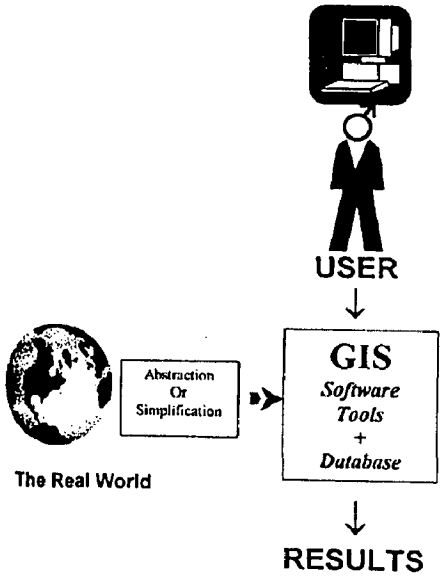


Figure 2.5

2.8.2.4. Data transformation: It embraces two classes of operation namely **(a)** transformations needed to remove errors from the data or to bring them up to date or to match them to other data sets and **(b)** the large array of analysis methods that may be applied in data in order to achieve answers to the questions asked of the GIS. (FIG. 2.6)

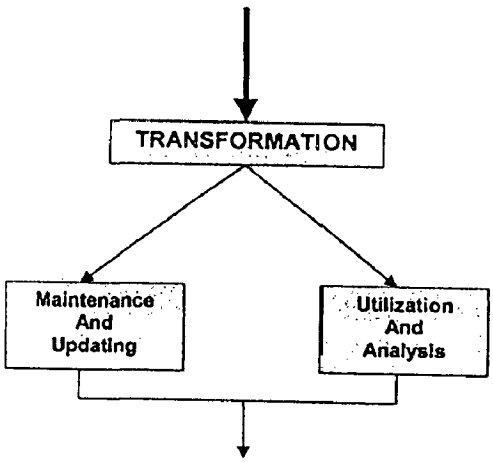


Figure 2.6

2.8.2.5. Interaction with the user: The interaction between user and GIS for data and query input and the writing of models for data analysis is an aspect that has been neglected until recently. ***The introduction of the personal computer and mouse or other pointing device and multi-windowing has made it much easier, for many people to use computers though typing skills are essential for most tasks. Voice interaction, virtual reality and multimedia with sound input and output are becoming available but still need to be developed fully for GIS. Whether the commands are given by typing, clicking on the window symbol with a mouse or by voice recognition, the user still has to ensure proper***

formulation according to an agreed set of rules; otherwise the results will be spurious. [19] (FIG 2.7)

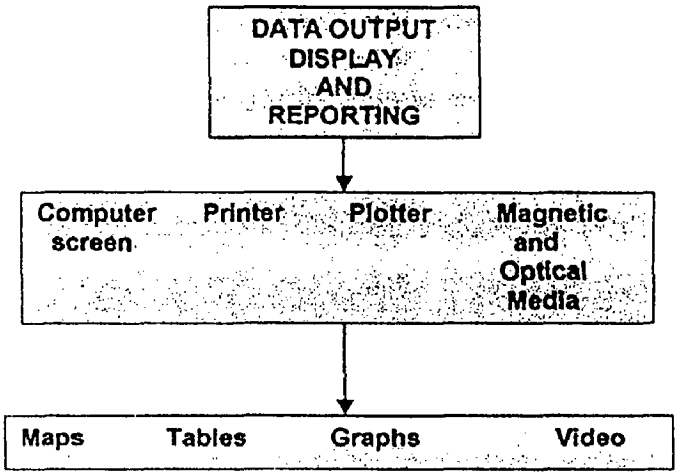


Figure 2.7

The user can also become part of GIS whenever complicated analyses, such as spatial analysis and modeling, have to be carried out. These usually require skills in selecting and using tools from the GIS toolbox and intimate knowledge of the data being used. At present and for years to come off -- the-shelf and general purpose GIS will rely upon the users to know what they are doing- pressing a button is not enough.

2.9. GIS DATA SOURCES:

The data to be entered in GIS are two types: Spatial data (geo-referenced data) and associated non-spatial attribute data. ***The spatial data represents the geographic location of the features (i.e. the location within geographic space where the features reside). Points, lines and areas are used to represent geographic features like a stream a lake or a forest. The non-spatial (attribute) data provide descriptive information like the name of a stream, the salinity of a lake, or the composition of a forest stand.*** Georeferenced data will normally be obtained from one or more of the following (a) existing maps, (b) Arial photographs, (c) satellite imagery, (d)data from air borne scanners, (e)field measurements, (f)other GIS databases and (g)from existing digital data. Non-spatial (attribute) data that are associated with the spatial data are obtained from field observation, point sampling, census figures, etc.

2.10. TYPES OF GEOGRAPHIC DATA:

There are four types of notations used for representation of geographic data: point, line, polygon and continuous surface.

Point Data:

They are the simplest types of spatial data. Points can represent observation related to discretely distributed phenomena such as water wells stations reporting precipitation measurements, etc.

Line Data:

Line entities are all linear features built up of straight-line segments made up of two, more co-ordinates. Line entities can be static or dynamic.

Polygon (Area) Data:

Polygon constitutes the most common data type used in GIS. They are bounded regions. The boundaries may be defined by the natural phenomena such as land forms or man made such as forest stand or land use unit.

Continuous Surface:

Example of continuous surfaces are (as part of topographic data), rainfall, temperature, etc. Most of GIS products cannot handle topographic data, usually as Digital Elevation Model (DEM).

2.11. DATABASE CONCEPT:

GIS are increasingly being built around existing Database Management System (DBMS). DBMS constitutes computer used to organize database. These programs are designed to facilitate storage and retrieval of large data collections. They include facilities to protect and secure data, enforce consistency of the data stored and make available to multiple users at a time.

The approach of building DBMS, therefore, substantially facilities the management of both location data and non-location data. ***The approaches in using DBMS are that they may handle both spatial and non-spatial data in which the non-spatial data are accessed through the DBMS while spatial data in which spatial data are handled directly through the GIS.***

The concept of database increases the benefit being from GIS. Some of the advantages that can be gained from database are: reduction in the data redundancy i.e., instead of independent, databases multiple users can use common data from a database for different

needs; maintenance of data integrity and quality (i.e., controlling and updating procedures can be implemented more efficiently using a database); and security restriction (database includes security tools to access to the data).

2.12. GIS DATABASE AND MANAGEMENT SYSTEM:

Geographic database is the collection of spatially referenced data that acts a model or reality. The stored information has certain characteristics by which it can be identified and handled. ***The information for geographic features has four major components, its geographic position, it attributes, its spatial relationships and time. More simply they are; 1. where it is, 2. what it is, 3. what is its relationship to other spatial features and 4. when did the condition or feature exists.*** [9]

Geographic Position (Location): Geographic data input are fundamentally a form of spatial (geo-referenced) data. Each feature has a location that must be specified in a unique way. Locations are recorded in terms of co-ordinate system like the longitude/latitude, eastings and northings, UTM (Universal Transverse Mercator) or state plane co-ordinates.

Attributes: Attributes are often termed non-spatial data. An attribute is a characteristic of an entity. Its value is the actual measurement that is stored in the database.

Spatial Relationship: This refers to the spatial relationships among the geographic features. These relationships are generally very numerous and may be complex. In practical terms it is not possible to store information about all the possible spatial relationships. Instead, only some of the spatial relationships are explicitly defined in the GIS and the remainder is either calculated as needed or is not made available.

Time: Geographic information is referred to a point of time or a period of time. The appropriate use of a given data depends upon its time (period) of collection. For instance, the land use system may be changed with time. Therefore, historical information may also be a valuable component of GIS database.

Taken together the four characteristics (geographic position, attributes, spatial relationships and time) make geographic data uniquely difficult to handle. Moreover, location data and attribute data often change independent of one another with respect to time, which is an added level of complexity that is difficult to handle. Solving such data

complexities are key capabilities of computer based Geographic information System through its Database Management System.

2.13. ADVANTAGES OF USING GIS:

GIS is a digital database management system designed to manage large volumes of non-spatial and spatially distributed data from a variety of sources. It is ideal for preliminary site studies, because it effectively stores retrieves, analyses and displays information according to user specified specifications. However, GIS can be limited by lack of available up-to-date data. [7]

Secondly, GIS eliminates the tedious process of paper mapping of facilities. In many cases, the cost of such mapping alone can justify a GIS implementation. Since, the manual integration and correlation of the information related to the factors to be considered are very tedious and complex. The latest computing and decision-making technologies offered in the form of a versatile GIS must be used.

Thirdly, it is easy to integrate the data of various natures. Remote sensing data product can be effectively used in GIS. Geo-coded satellite imagery can be directly used for onscreen digitization, for preparation of different thematic maps as land use, geology, stream network map etc.

PART II: DISTRICT RURAL PLANNING & PANCHAYATI RAJ

2.14. BACKGROUND

Present structure of District Administration has evolved out of the one created by the British Regime ruling India. The whole administrative machinery in general and the district administration in particular was geared to serve two basic objectives; the collection of land revenue and maintenance of land records. The Indian administrative system revolves around the district as the cutting edge of government, being its "eyes, ears and hands."

2.14.1. DISTRICT

Each State or Union Territory in India has been divided into distinct units called "Districts", ranging in different sizes, shapes, and of diverse economic and social significance. The general administration, including land and law and order administration of the country has functioned through these units for over the years, evolving a distinct pattern of administration all over the country. Without the fundamental unity of administration characterized by these administrative units all over the country, it would have become well-nigh impossible to administer, let alone plan for this vast country after we achieved independence. The amount of stability imparted to the transfer of power as a consequence of the well-established district units cannot be underestimated.

2.14.2. REVENUE DIVISION / SUB-DIVISION

The district is geographically divided into one or more units known as Sub-divisions. The officer-in-charge of this unit is called Sub-Divisional Officer (SDO) or Sub-Divisional Magistrate (SDM). Like District collector, he speaks with the voice of the Government in his own sub-division. He is a link between the District Collector and the Tahsildar in revenue matters and the District Magistrate and the Officer-in-charge of the Police Station in matters relating to law and order.

2.14.3. TAHSIL

The sub-division comprises one or more *Tahsils*. A *Tahsil* is the basic unit for purposes of general administration, treasury, land revenue, land records and other items of work. It has the closest and widest contact with the rural population. The officer-in-charge of the Tahsil is called *Tahsildar*.

The distinguishing function of this official all over the country is the maintenance of the Record of Rights, or the land records. In most parts of the country he is also the principal official in the district administration responsible for actual revenue collection. The administration at the *Tahsil* level is the farthest point of Government where revenue and land questions are dealt with.

2.14.4. DEVELOPMENT BLOCK

When considering the administrative units in a district, a very important one is the Development Block, which was inaugurated in 1950 at the commencement of the experiment on Community Development after independence. The Block, as it is usually called, was originally envisaged to contain a population of around 1 lakh, which would be provided with developmental services. The area of a Block is not necessarily a sub-set of the area of a *Tahsil* or even of a Sub-Division, though efforts are being made all over the country to restructure Blocks to fall within the boundaries of Sub-Divisions. Block boundaries, however, generally fall within that of a district.

As originally envisaged, almost all the developmental functionaries were attached to this office. But over the course of the years, the functionaries have tended to be absorbed back in the line departments and the Block office now represents a comparatively ramshackle look, dealing only with Rural Development programmes, and *Panchayati Raj*. The Block comprises today of one or more BDOs along with Extension Officers and *Gram Sevaks* or Village Level Extension Workers.

2.14.5. PARGANA

The next lower unit in revenue administration, which is however, not a mandatory division all over the country, is known as *Pargana* in U.P. The head of this unit is called supervisor

quanungo in U.P. He is in-charge of revenue administration and land records of every village within his area. He is the first line supervisor in the chain of revenue administration in the States.

Revenue functions of a smaller group of villages are usually performed by the *Patwari* in most parts of the country. The *Patwari* is responsible for all the work connected with land problems. He is the busy-body of the government for performance of a multitude of functions including collection of village statistics. S.S. Khera has written, "Anyone who either comes from a village or has lived in a village, or has had anything to do with a village especially concerning the land or agriculture, will appreciate what is meant when we say that a *Patwari* is the king pin of the revenue administration in the district."

2.14.6. VILLAGE

The lowest unit for all administrative, plan and fiscal purposes in all the States in India is the village which is administered by a village establishment, comprising village headman and *Lekhpal* in U.P. The bottom level functionary is *Lekhpal* in U.P. and Uttaranchal. **[19]**

2.15. COORDINATION AT THE DISTRICT LEVEL

Most state departments are represented at the district level by their own officers. As a result, the district headquarters today hum with the music of activities, functioning as if these were the subsidiary capitals of the State.

Of crucial importance, consequently, is the need for coordination and integration of activities of these different functionaries. Increase in the tempo of development activities has caused an increase in the number of district officers and, also in their commitments in terms of more departmental programmes.

How to weld and coordinate these sectoral programmes has been both baffling and intriguing. Who should be charged with this responsibility of coordinating the activities of technical functionaries operating in the developmental field? It has been envisaged in the original pattern of thinking that the District Collector is to perform these functions, but there is also a view that the District Collector, on account of reasons perhaps beyond his

control, has not been able to emerge as an effective coordinator. As a commentator said: "The position of the Collector in the most States of the Union is not an enviable one".

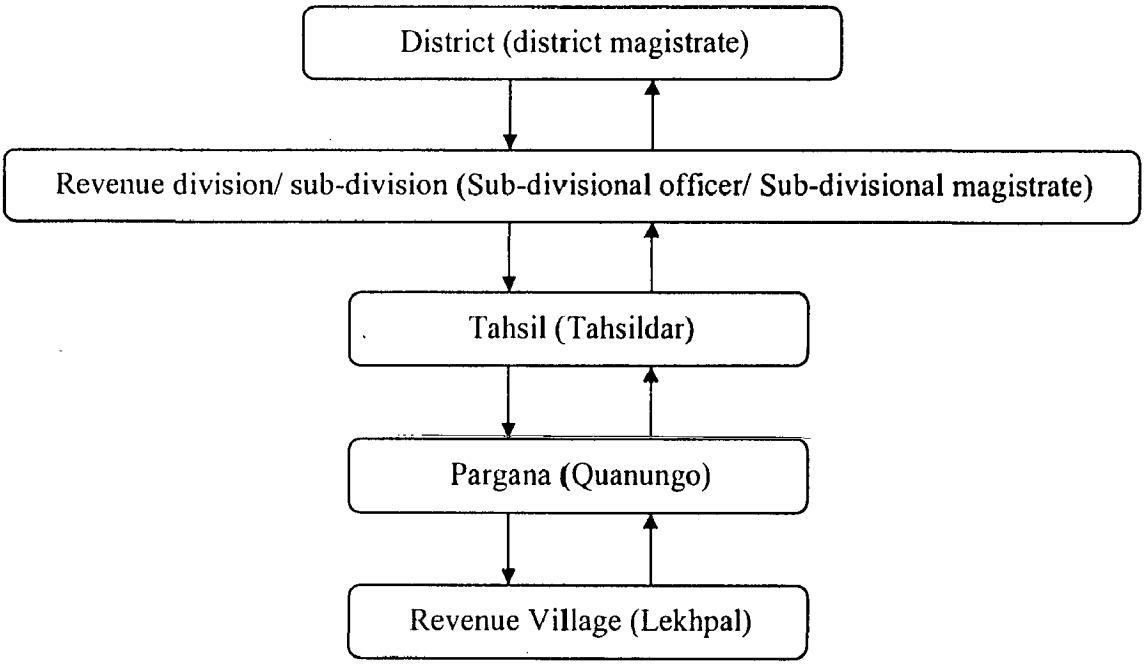


Figure 2.8: District Administration

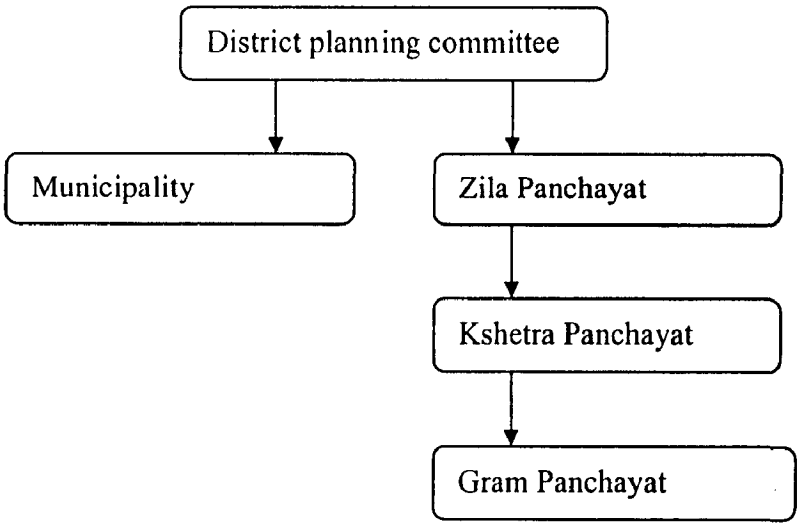


Figure 2.9: Panchayati Raj Institution

2.16. FUNCTIONS OF THE DISTRICT COLLECTOR

In spite of the recent changes taking place in parts of the country, it can be said that the District Collector continues to retain the role to this date of the pivot of district administration, shouldering direct responsibilities in both traditional and emerging fields.

While his responsibilities have markedly increased, he operates today with distinctly reduced status and prestige, thanks, among other things, to the emergence of a network of district level functionaries who no longer regard him as an unquestionably superior authority, and of the progressive strengthening of the institution of Panchayati Raj. Notwithstanding these momentous changes, it is to him that the Government instinctively turns in times of emergency. And, he has been responding to these challenges in a manner so as to confirm the resilience and vitality of this institution.

2.17. PANCHAYATI RAJ AND THE DISTRICT ADMINISTRATION

2.17.1. PANCHAYATI RAJ SYSTEM IN INDEPENDENT INDIA

After the independence, Community Development Programme was started in 1952 AD. But because it was not attached with the people, therefore it couldn't prove to be a success story. People took it as a burden put on them by the government. A team, under the leadership of Balwant Rai Mehta tried to find out the cause for the failure of this programme and came up with the inference that there should be an organization at village level, which would select the true beneficiaries and implement various government programmes and schemes.

This organization would act as the representative of all the villagers and should ensure the development of the village as well as participation of villagers. In this way Balwant Rai Mehta tried to achieve local self-government though Panchayats (the organization). This concept of local self-government was the right step towards decentralized democracy. In this process, the State of Rajasthan for the first time adopted the three leveled structure of Panchayati Raj – Village Level, Intermediate Level and District Level.

In 1977 AD. Ashok Mehta Committee was set up to review the working of Panchayats. The committee found out that Panchayati Raj is the soul of democracy and therefore it

should be empowered with more authority. Those Panchayats which formed after 1977 AD are known as Second Generation Panchayats.

During the decade of 1990, it was realized that without constitutional power, the self-government can't be fruitful; therefore the Central Government passed the 73rd Constitutional Amendment Act in 1992, which became effective from 20th April 1993 (from the date of publication in the Gazette of India). **[27]**

2.17.2. BASIC CONCEPTS OF PANCHAYATI RAJ

The basic concept of Panchayati Raj is that the villagers should think, decide and act for their own socio-economic interests. Thus Panchayati Raj Act is related to village self-governance, where the people in the form of an organization will think, decide and act for their collective interest. Self-government allows us to decide about ourselves without hampering others interest. Whenever we talk about collective benefit one point is clear that there is no conflict between the villagers' collective interest on one side and societal and national interest on the other, rather they are complementary. Where the Panchayats end their activities the state govt. takes them up. The state govt. plays their major roles.

- To support the village Panchayats
- To co-ordinate the village Panchayats
- To ensure the implementation of this system.

Besides these, once the democratic institution in the villages and towns becomes strong, the people's representatives can express the problems of their constituency in a better way. This will help in policy determination for national interest. This plan for *'Swaraj'* (Self-government) can't be fulfilled only by making a new law. For the success of self-government self reliance is must. The self-reliance means: every village must produce according to its capacity and try to increase its capacity, which can be achieved in following ways:

- By identifying economic and human resources of the Panchayat area,
- By estimating the capacity of these resource,
- By making decision for utilizing these resources,

- By formulating plans,
- By implementing plans,
- By evaluating plans.

Thus we find that self-governance is a concept, which is the base for success of democracy. And for self-governance Panchayati Raj System is a must.

2.17.3. SOME IMPORTANT FEATURES OF THE PANCHAYATI RAJ ACT

Three Leveled System:

The Legislature of a state may, by law, make provisions for three leveled system-village level, intermediate level and district level.

Election:

The representatives are elected for 5 years by the electorate of a Panchayat area.

Reservation of Seats:

Some seats in the Panchayat shall be reserved for the Scheduled Castes, Scheduled Tribes and Women. The number of reserved seats for Schedules Castes and Scheduled Tribes will be proportionate to the ration of population of SCs and STs to Total Population of the Panchayat area. One third of the total seat will be reserved for women. It will include the reserved seats for SCs and STs.

Responsibility:

Panchayats have two main responsibilities

- To plan for economic development and social justice.
- To implement these plans.

Powers and Authorities:

The Legislature of the State may authorize a Panchayat to levy, collect and appropriate taxes, tolls and fees. It may also provide the Panchayat for making grants-in-aid to form the Consolidated Fund of the State. These funds can be used for implementing the plans.

2.17.4. CONSTITUTION OF FINANCE COMMISSION:

Finance Commission has to be constituted in every state to review the financial position of the Panchayats and to make recommendation to the Governor regarding the allocation of fund to be Panchayats.

2.17.5. PANCHAYAT AND ENVIRONMENT:

Although the 73rd Amendment Act has not mentioned the term "Environment" in the Schedule IX but out of the 29 duties some are related to environment in one way or the other, these are

- Agriculture, including agricultural extension.
- Land improvement, implementation of land reforms, lands consolidation and soil conservation.
- Minor irrigation, water management and watershed development.
- Social forestry and farm forestry.
- Minor forest produce.
- Small scale industries including food-processing industries.
- Khadi, village and cottage industries.
- Rural housing.
- Drinking water.
- Fuel and fodder.
- Non-conventional energy sources.
- Education including primary and secondary schools.
- Health and sanitation, including hospitals, primary health centers and dispensaries.
- Maintenance of community assets.

2.17.6. CENTRE ON PANCHAYATI RAJ AND ENVIRONMENT

During the decade of 1990, it was realized that without constitutional power, the self-government or Panchayati Raj couldn't be fruitful; therefore the Central Government passed the 73rd constitutional Amendment Acts of 1992, which became effective from 20th April 1993. The basic concept of *Panchayati Raj* is that the villagers should think,

IES publish a quarterly newsletter named *"Panchayat"* to disseminate various environmental news, government schemes and other information useful for empowerment of Panchayats and grass root people. Besides, the Centre has published resource materials for environmental awareness among common people and organizes training camps and workshops. The newsletter and booklets are widely distributed among user groups. The Centre also provides useful information about various publications and resource materials on Panchayati Raj and Environment as well as about organizations involved with Panchayats. The Centre is also compiling Success Stories in this context from various parts of the country.

2.18. THE UTTAR PRADESH PANCHAYAT LAW ACT

2.18.1. ZILA PANCHAYAT

Every elected member of the *Zila panchayat* representing the constituency which comprises, wholly or partly, any *Kshetra Panchayat*, shall be entitled to take part and express his views in the meetings of such *Kshetra panchayat* as a special invitee but shall have no right to vote in such meeting.

The *Zila panchayat* shall have the following posts of officers:

1. *Mukhya Adhikari* (chief executive officer) or (chief development officer)
2. *Apar Mukhya Adhikari*
3. *Vitta Adhikari*
4. *Chikitsa avam swasthya Adhikari* (deputy chief medical officer)
5. *Peyjal Abhiyanta* (executive engineer, jal nigam)
6. *Vikas Adhikari* (district development officer)
7. *Karya Adhikari*
8. *Abhiyanta*
9. *Basic shiksha Adhikari* (Basic shiksha Adhikari)
10. *Krishi Adhikari* (District agriculture officer)
11. *Sahkarita Adhikari* (Assistant registrar, cooperative societies)
12. *Pashudhan Adhikari* (chief veterinary officer)
13. *Samaj kalyan Adhikari* (district social welfare officer)
14. *Grameen abhiyantran Abhiyanta* (executive engineer, rural engineering service)
15. *Yuva kalyan Adhikari* (district youth welfare officer)

decide and act for their own socio-economic interests. Thus, it is related to village self-governance, where the people in the form of an organization will think, decide and act for their collective interests.

For integrated rural development decentralization of power and resources to Panchayati Raj Institutions (PRIs) is an essential element. It has been also realized that Panchayat can play effective role through drawing local people's participation in sustainable harvesting and management of local resources. If financial and technical assistance is provided to them, they will certainly take positive initiatives in solving local environmental problems. Agriculture, land improvement, forestry, tree planting, animal husbandry, village and cottage industries, drinking water, poverty alleviation programmes, health, sanitation, family welfare etc. are necessarily the concern of the village Panchayats.

To fulfill the expectations of rural development consideration of environment in its totality (economic, political, technological, cultural, historical, moral and aesthetics) is very essential. Documenting environmental issues form local, national and international points of view for providing insight into environmental problems and to promote environmental consciousness among rural masses are equally important. Therefore, Ministry of Environment and Forests, Government of India, has set up ENVIS Centre on Panchayati Raj and Environment at Indian Environmental Society (IES), Delhi under the ENVIS scheme, with the following main objectives.

OBJECTIVES:

- To develop facilities for collection, compilation and dissemination of information related to environment and rural development to the Panchayats.
- To develop networking of Panchayati Raj Institutions and work as connecting link between Ministry and Panchayats.
- To provide regular input to Panchayat about latest happenings in the field of environment through Newsletter, other resource material and training programmes.
- To conduct training programmes on various crucial issues of environment and related areas prevailing in Panchayats.

16. *Bhoomi sanrakshan Adhikari* (district soil conservation officer)
17. *Udyan Adhikari* (district horticulture officer)
18. *Panchayat Raj Adhikari* (district panchayat raj officer)
19. *Laghu sinchai Adhikari* (executive engineer, minor irrigation)
20. *Bal vikas Adhikari* (district programme officer, child development project)
21. *Kar Adhikari*
22. *Matsya Adhikari* (assistant director, fisheries or chief executive officer, fish farmers development agency)
23. *Ganna Adhikari* (district cane development officer)
24. *Dugdha Adhikari* (deputy dairy development officer)
25. *Madhyamik shiksha* Adhikari (deputy inspector of schools)
26. *Nalkoop Adhikari* (executive engineer, tube well)

2.18.2. RIGHT OF ZILA PANCHAYAT TO TAKE ASSISTANCE AND ADVICE FROM CERTAIN GOVERNMENT SERVANTS

It shall be the duty of the officers hereinafter specified to render such assistance and to give such advice to the *Zila Panchayat* in so far as it concerns their respective departments as may necessary or desirable, or as the *Zila Panchayat* may require, for the purpose of implementing the district plan programme and the other work of the *Zila Panchayat*:

1. Executive Engineer, PWD to be nominated in this behalf by the Superintending engineer of the concerned circle;
2. Executive Engineer, UPSEB to be nominated in this behalf by the Superintending engineer of the concerned circle;
3. Executive Engineer, (Canal) to be nominated in this behalf by the Superintending engineer of the concerned circle;
4. Chief medical officer;
5. Divisional forest officer exercising jurisdiction in the district;
6. District supply officer;
7. Deputy regional marketing officer;
8. District economics and statistics officer;
9. General manager, District industries centre;
10. Such other officers, of the district as are in charge of the department concerned with any of the functions of the Zila Panchayat.

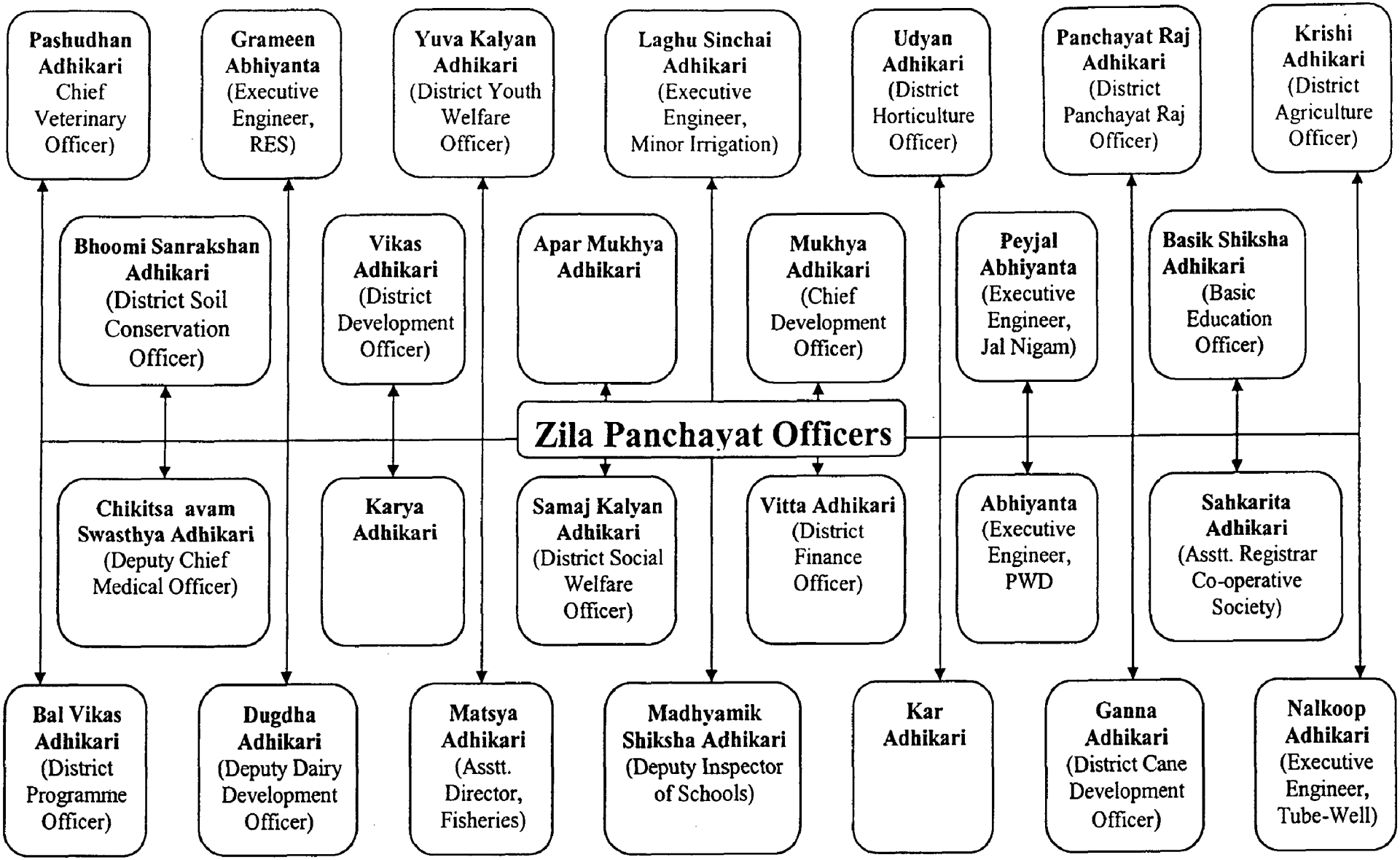


Figure 2.10: Role of Govt. officers in Zila Panchayat

2.18.3. CONSTITUTION OF COMMITTEES OF ZILA PANCHAYAT

Every committee shall consist of a chairman and six other members, who shall be elected by the members of the *Zila panchayats* from amongst themselves. In each committee there shall be at least one woman member, one SC/ST member and one backward class member.

The chairman of any such committee shall be the *Adhyaksha* or *upadhyaksha* or any other member of the *Zila panchayat.*

2.18.4. CONSTITUTION OF COMMITTEES OF KSHETRA PANCHAYAT

Every committee shall consist of a chairman and six other members, who shall be elected by the members of the *Kshetra panchayats* from amongst themselves. In each committee there shall be at least one woman member, one SC/ST member and one backward class member.

The chairman of any such committee shall be the *Pramukh* or *up-Pramukh* or any other member of the *Kshetra panchayat.*

2.18.5. WITHDRAWAL FROM AND DISBURSEMENT OF THE FUND OF KSHETRA PANCHAYAT

All withdrawal of money from the *Kshetra Panchayat* and disbursement thereof shall be made jointly by the *Pramukh* and the Block development officer.

2.18.6. CONSTITUTION OF COMMITTEES OF GRAM PANCHAYAT

Every *Gram panchayat* shall constitute such committee or committees as may be notified by the state government to assist the *gram panchayat* in the performance of all or any of its functions and may delegate to such committee or committees such of its power of functions as it may deem fit. Every committee shall consist of a chairman and six other members, who shall be elected by the members of the gram panchayats from amongst themselves. In each committee there shall be at least one woman member, one SC/ST member and one backward class member.

The chairman of any such committee shall be the *Pradhan* or *up-Pradhan* or any other member of the *gram panchayat.*

All withdrawal of the money from the gram fund and disbursement thereof shall be made jointly by the *Pradhan* and the secretary of the *gram panchayat.* All records of the *gram panchayat* shall be in the custody of its secretary.

The secretary shall give to a person, on an application and on payment of such fee as may be prescribe, a copy of any such records and certify it as a true copy under his signature and seal of the *gram panchayat.*

2.18.7. POWER AND DUTIES OF COMMITTEES

There shall be six committees at each level; *Zila panchayat, Kshetra panchayat* and *gram panchayat.* Their power and duties are as follows:

Name of committee	*Power and duties*
Planning and development committee	To prepare schemes of *Zila/ Kshetra/ Gram panchayat.*
	Implementation of schemes and programmes related to agriculture, livestock and poverty alleviation.
Education committee	Implementation of programmes related to primary education, higher primary education and informal education.
Construction work committee	Control over all temporary and permanent construction work.
Health and welfare committee	Implementation of programmes related to health, medical and family welfare.
Administrative committee	All subject related to workers/ employees, working under control of *Zila/ Kshetra/ gram panchayat.*
Water management committee	Management and maintenance of tube wells.
	Management of schemes and programmes related to potable water.

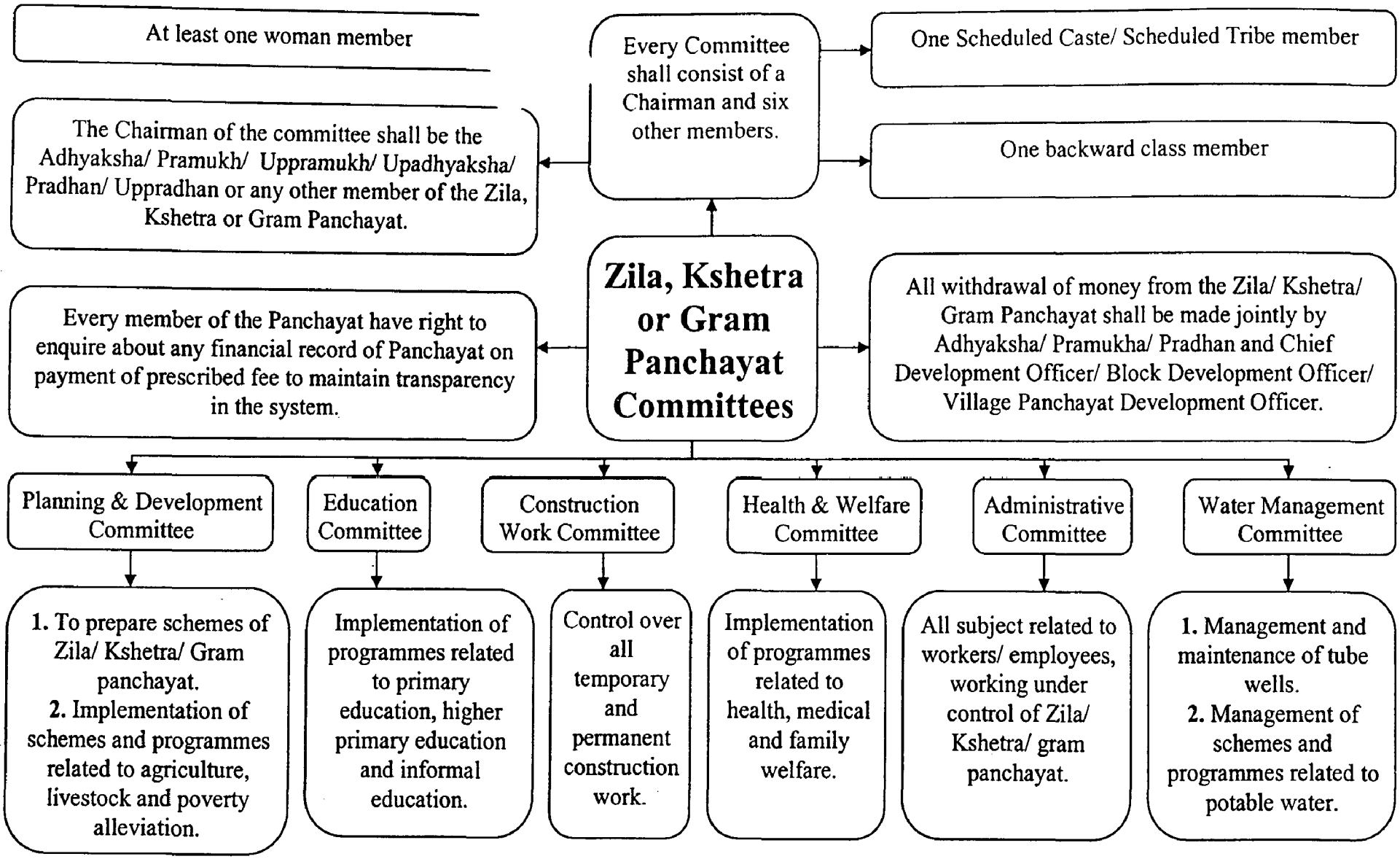


Figure 2.11: Composition and power of Panchayat Committees

2.19. DISTRICT PLANNING COMMITTEE

For integrated development of a district, there should be a planning organization at district level to take care of development activities. Keeping this in view, after 73rd amendment, a provision is made to constitute a planning committee in each district by law. The aim of the committee is to consolidate the plans prepared by panchayats and the municipalities in the district and to prepare a draft development plan for the district as a whole

2.19.1. OBJECTIVES OF THE COMMITTEE

The committee shall in preparing the draft development plan have regard to:

- Matters of common interest between the panchayats and municipalities including spatial planning, sharing of resource, the integrated development of infrastructure and environmental conservation;
- The extent and type of available resources whether financial or otherwise.

2.19.2. COMPOSITION OF THE COMMITTEE

The committee shall consist of 20 to 40 members:

- 4/5 of the total members of the committee shall be elected in the prescribed manner, and from amongst, the elected members of the *Zila panchayats* and of the municipalities in the district in proportion to the ratio between the population of the rural areas and of the urban areas in the district;
- The remaining 1/5 members of the committee shall be:
    - A minister nominated by the state government, who shall be the chairperson of the committee;
    - The *Adhyaksha* of the *Zila panchayat*;
    - The *Nagar Pramukh* or president of the municipality;
    - District magistrate.

The chief development officer of the district shall be the ex-officio secretary of the committee and shall be responsible for maintaining records of the committee. The chief development officer includes chief executive officer. The economic and statistics officer of the district shall be the ex-officio joint secretary of the committee to assist the committee.

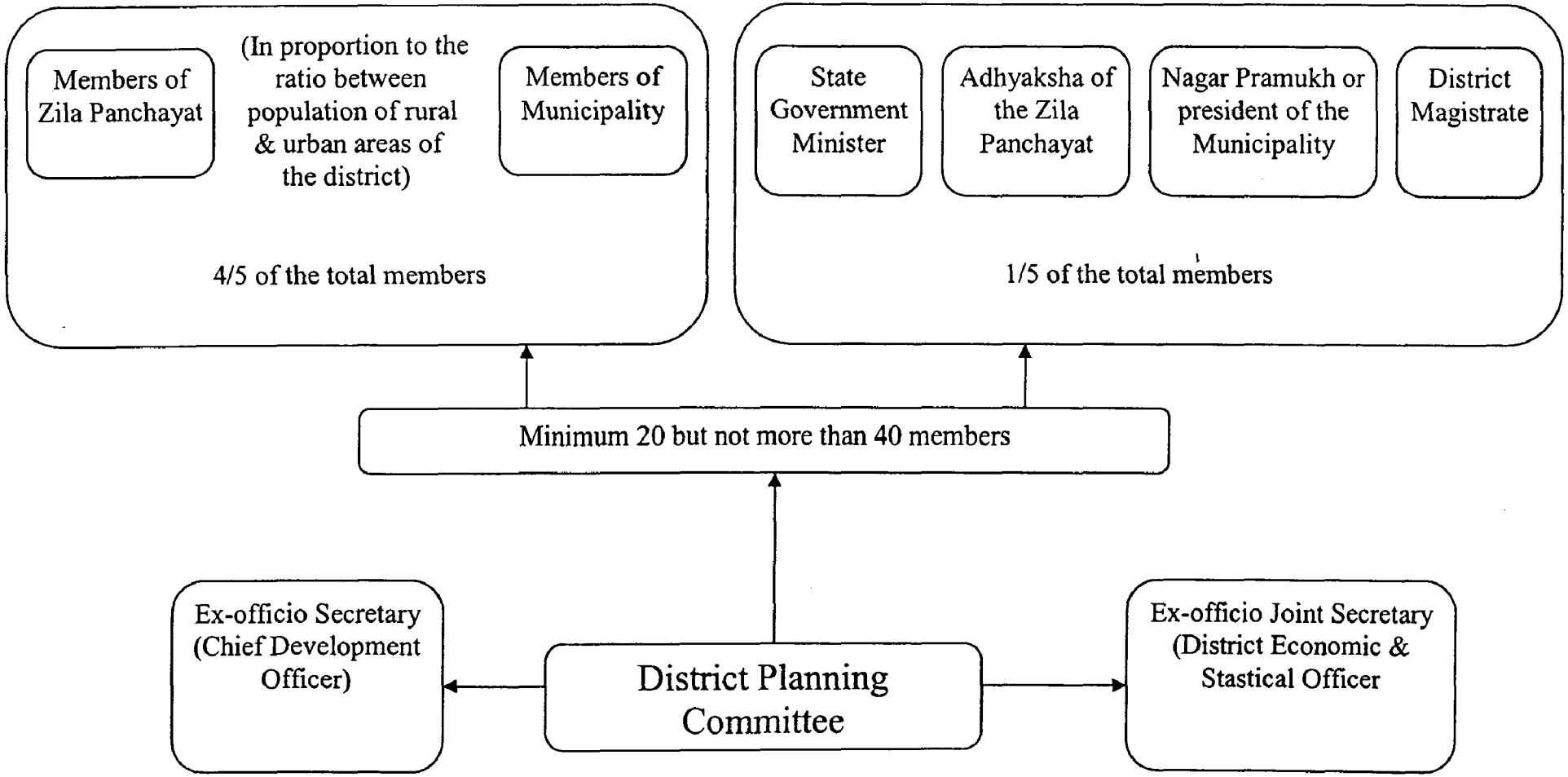


Figure 2.12: Composition of the District Planning Committee

2.19.3. FUNCTIONS OF THE COMMITTEE

The committee shall perform the following functions:

1. To identify local needs and objectives within the framework of national and state plan objectives;
2. To collect, compile and update information relating to natural and human resources of the district to create a sound database for decentralized planning and preparation of district and block resources profiles;
3. To list and map amenities at village, block and district levels;
4. To determine policies, programmes and priorities for development of the district, in order to ensure maximum and judicious utilization and exploitation of the available natural and human resources;
5. To modify or amend and consolidate the draft five year plan of annual development plan prepared for the rural and urban areas; keeping in view the over-all plan objectives and strategies;
6. To submit development plan to the state government in such manner as may be prescribes;
7. To prepare employment plan for the district;
8. To prepare estimate of financial resources for financing the district plan;
9. To allocate sectoral and sub-sectoral outlays within the overall framework of the district development plan;
10. To monitor, evaluate and review progress under the schemes and programmes being implemented in the district under the decentralized planning framework including central sector and centrally sponsored schemes, and the local area development schemes of the parliamentary constituencies and assembly constituencies;
11. To submit regular progress reports to the state government in respect of schemes included in the district plan;
12. To identify schemes and programmes which require institutional finance, device appropriate forward and backward linkages with the plans and ensure requisite flow of such investment;

13. To ensure participation voluntary organizations in the overall development process;
14. To make suggestions and recommendations to the state government with regard to state sector schemes having significant bearing on the process of development of the district to finalize site selection for different works and schemes.

2.19.4. SCOPE OF THE COMMITTEE

The district plan may also include such other matters as may be considered necessary by the committee or as the state government may direct.

2.19.5. MEETINGS OF THE COMMITTEE

The meeting of the committee shall be held at least once in every quarter at the district head quarter on such date and time as may fixed by the chair person. The committee may invite experts to attend its meeting on such term and conditions as may be prescribed.

2.19.6. POWER OF THE STATE GOVERNMENT TO ASSIGN FUNCTIONS TO THE COMMITTEE

The state government may assign to the committee such functions relating to district planning, coordination and monitoring covering the activities of different departments of the state government as may be deemed necessary. **[12]**

2.20. DISTRICT RURAL DEVELOPMENT AGENCY

The District Rural Development Agency (DRDA) has traditionally been the principal organ at the District level to oversee the implementation of different anti poverty programmes.

2.20.1. OBJECTIVES

The primary objective of the new Scheme of DRDA Administration is to professionalize the DRDAs so that they are able to effectively manage the anti poverty programmes of the Ministry of Rural Development and interact effectively with other agencies. The DRDAs will maintain a distinctive identity with Panchayati Raj Institutions.

2.20.2. ROLE AND FUNCTIONS

1. If effective programme design is critical to successful implementation of rural development programmes, so is an effective delivery agency. None of the anti-poverty programmes can have impact unless they are implemented with clarity of purpose and a commitment to the task. It is here that the DRDAs play a critical role. The DRDAs are not the implementing agencies, but can be very effective in enhancing the quality of implementation through overseeing the implementation of different programmes and ensuring that necessary linkages are provided. To this extent the DRDA is a supporting and a facilitating organization and needs to play a very effective role as catalyst in development process.
2. The District Rural Development Agency is visualized as specialized and a professional agency capable of managing the anti-poverty programmes of the Ministry of Rural Development on the one hand and to effectively relate these to the overall effort of poverty eradication in the District. In other words, while the DRDA will continue to watch over and ensure effective utilization of the funds intended for anti-poverty programmes, it will need to develop a far greater understanding of the processes necessary for poverty alleviation/eradication. It will also need to develop the capacity to build synergies among different agencies involved for the most effective results. It will therefore need to develop distinctive capabilities rather than perform tasks. The role of the DRDA will therefore be distinct from all the other agencies, including the *Zilla Parishad.*
3. DRDAs must themselves be more professional and should be able to interact effectively with various other agencies. They are expected to coordinate with the line departments, the Panchayati Raj Institutions, the banks and other financial institutions, the NGOs as well as the technical institutions, with a view to gathering the support and resources required for poverty reduction effort in the district. It shall be their endeavour and objective to ensure inter-sectoral and inter-departmental coordination and cooperation for reducing poverty in the district. It is their ability to coordinate and bring about a convergence of approach among different agencies for poverty alleviation that would set them apart.
4. The DRDAs are expected to coordinate effectively with the Panchayati Raj Institutions. Under no circumstances will they perform the functions of PRIs.

5. The DRDAs will maintain their identity but will function under the chairmanship of the Chairman of the *Zilla Parishad*. They are expected to be a facilitating and supporting organization to the *Zilla Parishad*, providing necessary executive and technical support in respect of poverty reduction efforts. Wherever the *Zilla Parishads* are not in existence or are not functional, the DRDAs would function under the Collector/District Magistrate/Deputy Commissioner, as the case may be.
6. The DRDAs are expected to oversee the implementation of different anti-poverty programmes of the Ministry of Rural Development in the District. This is not to be confused with actual implementation, which will be by the Panchayati Raj and other Institutions. The DRDAs will monitor closely the implementation through obtaining of periodic reports as well as frequent field visits. The purpose of the visit should be to facilitate the implementing agencies in improving implementation process, besides ensuring that the quality of implementation of programmes is high. This would include overseeing whether the intended beneficiaries are receiving the benefits under the different programmes.
7. The DRDAs shall keep the *Zilla Parishad*, the State and Central Government duly informed of the progress of the implementation of the programmes through periodic reports in the prescribed formats. Special report, as and when called for, shall be provided.
8. It shall be the duty of the DRDAs to oversee and ensure that the benefits specifically earmarked for certain target groups (SC/ST, women and disabled) reach them. They shall take all necessary steps to achieve the prescribed norms.
9. The DRDAs shall take necessary step to improve the awareness regarding rural development and poverty alleviation particularly among the rural poor. This would involve issues of poverty, the opportunities available to the rural poor and generally infusing a sense of confidence in their ability to overcome poverty. It would also involve sensitising the different functionaries in the district to the different aspects of poverty and poverty alleviation programmes.
10. The DRDAs will strive to promote transparency in the implementation of different anti-poverty programmes. Towards this end, they shall publish periodically, the details of the different programmes and their implementation.
11. Keeping in view, the substantial investment that are being made in poverty alleviation programmes, the DRDAs shall ensure financial discipline in respect of

the funds received by them, whether from Central or State Governments. They shall also ensure that the accounts are properly maintained including in respect of the funds allocated to banks or implementing agencies in accordance with the guidelines of different programmes.

12. Thus the role of the DRDA is in terms of planning for effective implementation of anti-poverty programmes; coordinating with other agencies – Governmental, non-Governmental, technical and financial for successful programme implementation; enabling the community and the rural poor to participate in the decision making process, overseeing the implementation to ensure adherence to guidelines, quality, equity and efficiency; reporting to the prescribed authorities on the implementation; and promoting transparency in decision making and implementation.
13. In addition the DRDAs shall coordinate and oversee the conduct of the BPL Census and such other surveys that are required from time to time.
14. The DRDAs shall also carry out / aid in carrying out action research / or evaluation studies that are initiated by the Central / State Governments.
15. The DRDAs should deal only with the anti poverty programmes of the Ministry of Rural Development. If DRDAs are to be entrusted with programmes of other ministries or those of the State Governments, it should be ensured that these have a definite anti-poverty focus. Entrusting of any programme to the DRDAs, other than anti-poverty programmes of the Ministry, be it of any other Ministry of Government of India or the respective State Government will have to be done with the approval of the Secretary, Rural Development of the respective State(s), who should examine such request in consultation with the Ministry of Rural Development, Government of India. In such cases, it must be ensured that adequate provision is made for requisite staffing needed for proper implementation of the programme.

2.20.3. ADMINISTRATIVE STRUCTURE

Rural Development Department has the following administrative structure at various levels.

State Level: The Department is functioning under the over all control of the Commissioner-cum-Secretary at the Government level assisted by Director-cum-Special Secretary, Additional Director-cum-Additional Secretary and other officers.

District Level: At district level, District Rural Development Agency (DRDA) is responsible for the implementation and monitoring of all rural development programmes.

Block Level: At block level, Block Development Officer is the main catalyst with some subordinate staff. Besides the departmental staff at block level following staff from other departments is also functioning under the administrative control of the Block Development Officer with regard to ACR, tour programmes and casual leaves.

1. Assistant Development Officer (Agriculture)
2. Assistant Development Officer (Horticulture)
3. Extension Officer (Co-operative)
4. Extension Officer (Industries)
5. Panchyat Inspectors
6. Assistant Development Officer/ Junior Engineers (Soil Conservation)

2.20.4. DRDA ADMINISTRATION

1. As indicated, the role of the DRDA is to perform tasks which are distinct different from institutions / departments. However, the DRDAs are very much part of the district. They shall function accordingly.
2. The DRDA shall be a registered society registered under a Society Registration Act or a distinct cell in the Zilla Parishad having a separate identity. The chairman of the Zilla Parishad shall be the chairman of governing body of the DRDA. The executive and financial functions shall however lie with CEO, Zilla Parishad / District Collector which shall be designated as the Chief Executive Officer or Executive Director. It shall be his responsibility to ensure that the administration of DRDA and the programmes are conducted in accordance with the guidelines. Wherever the Zilla Parishads are not in existence or are not functional, the DRDAs would function under the Collector / District Magistrate / Deputy Commissioner of the District, as the case may be.

3. The administration of the DRDA shall be carried out by a governing body. Governing Body of the DRDA will provide policy directions, approve the annual plan and also review and monitor the implementation of the plan, including the different programmes. They shall give such directions to the DRDA as may be necessary from time to time. The Governing Body of the DRDA will meet once in a quarter.
4. The composition of the governing body shall be as follows:

1	Chairman of Zilla Parishad	Chairman
2	All MPs and MLAs and MLCs of the District	-
3	1/3rd of Panchayat Samiti Chairpersons to be nominated by rotation in alphabetical order for a tenure of one year, one of whom must belong to SC/ST and another a woman.	-
4	CEO of Zilla Parishad / District Collector	Chief Executive Officer / Executive Director.
5	Head of Central Cooperative Bank of the District.	-
6	Chairman, Regional Rural Bank.	-
7	District Lead Bank Officer	-
8	Representative of the Reserve Bank of India at district level	-
9	NABARD representative at district level	-
10	General manager, DIC	-
11	Representative of KVIB	-
12	District Officer, incharge of scheduled Caste/Scheduled Tribe welfare	-
13	District Women & Child Welfare Officer	-
14	District Officer dealing with welfare of the disabled	-
15	One representative from technical institutions	-
16	Two representatives of NGOs	-
17	Two representatives of the weaker sections, one of whom may be drawn from SCs and STs	-
18	One representative of rural women	-
19	Project Director, DRDA	Member Secretary

5. Wherever the Zilla Parishads are not in existence, the State Government may nominate elected members of the State Legislature from the concerned districts to act as Chairman of the Governing Bodies of the DRDAs.
6. All executive and financial powers of the DRDA shall be exercised by the Executive Committee as per a scheme of delegation of financial and executive powers to be determined by each State/UT Government and this Committee will be fully accountable in all matters of DRDA to the governing body as well as to the Government. The Executive Committee of DRDA shall be headed by the Chief Executive Officer / Executive Director and shall consist of all the District level officers and any other officer deemed necessary for planning and implementation of the anti-poverty programmes. The Project Director DRDA will be the Member Secretary of the EC. The Executive Committee will meet at least once in a month.

2.20.4.1. PROJECT DIRECTOR

1. Each DRDA should be headed by a Project Director, who should be of the rank of an Additional District Magistrate. The Project Director should preferably be a senior scale officer of the All India Services or a senior officer of the State Service, eligible for appointment to the All India Services, would be in overall charge of the activities of the DRDA and responsible for interaction with the District/State administration as well as with the Government of India. The PD should be exclusively for the DRDA work.
2. Government of India has suggested to all the State governments that the Chairman, Zilla Parishad should be the chairman of the governing body of the DRDA.
3. Each DRDA should have the following wings :
    a. Self-employment Wing;
    b. Women's Wing;
    c. Wage employment Wing;
    d. Engineering Wing;
    e. Accounts Wing;
    f. Monitoring and Evaluation Wing; and
    g. General Administration Wing.

2.20.4.2. SELF EMPLOYMENT WING

1. The self-employment Wing shall be headed by a Project Officer and should have APOs in the field of planning, social mobilisation, credit and Technology. The Project Officer may be specifically responsible for any of these four functions. The APO (Planning) would look after the activity clusters, district/block/ village group plans, guiding the BDOs and others in plan preparation, planning for infrastructure including marketing infrastructure. He would coordinate with the district officers, the banks as well as other institutions in the district. The APO (Social Mobilisation) would look after group formation, capacity building, monitoring of groups, choice of activities for groups, release of revolving funds and coordination. The APO (Credit), who should be from the commercial banking sector, would coordinate with the banks in all matters relating to credit, including the interface between the bankers and the beneficiaries / beneficiary groups, loan disbursements as well as loan recovery. The APO (Technology) would look after issues concerning Technology upgradation as well as transfer of technology.
2. The DRDAs would be drawing up projects for specific activities under the Self-employment programmes. It would be necessary to have suitable experts to oversee the successful implementation of such projects. As part of the overall programme management, the DRDAs may take outside experts on a consultancy basis. Secretary, Rural Development of each State should develop guidelines for selection of consultants so as to avoid any wrong use of such provisions and to see that only those who have a proven practical expertise are engaged. Such experts to be engaged on project specific basis will function under the overall control and supervision of the Project Officer, self-employment programmes.

2.20.4.3. WOMEN WING

In order to ensure that women receive adequate attention in all the anti-poverty programmes, a Women's Cell should be set up in each DRDA. This Cell would establish necessary synergy with Departments such as Women & Child Development, Education and Health Department to ensure that women not only receive their due share in the anti-poverty programmes but are also able to receive benefits of other programmes.

The Women's Wing will be headed by an Asst. Project Officer, who will function under the overall co-ordination of the project officer of the self-employment wing.

2.20.4.4. WAGE EMPLOYMENT WING

The Central concern of the DRDA in the wage-employment programmes should relate to planning, monitoring and vigilance by a technical wing. The DRDA should not concern it self with the actual implementation and execution of works which can be done by the line departments / engineers or the Panchayati Raj Institutions. At the same time, the magnitude of the wage employment programmes being large, there is a great deal of coordination required. DRDA will have a wage-employment wing, with a Project Officer assisted by a small complement of staff.

2.20.4.5. WATERSHED WING

A Watershed Wing will be set up in the DRDA in all such districts where IWDP / DPAP / DDP is in operation. This wing should consist of a Project Officer, assisted by a small compliment of staff. This staff would be independent of the programme support in the form of PIAs or Watershed committees.

2.20.4.6. ENGINEERING WING

Each DRDA should have a technical wing, which should also be responsible for innovations in design or used of materials, as well as training of the engineering personnel of the line departments or the PRIs. This wing should be manned by an Executive Engineer assisted by one or two Assistant / Junior Engineers.

2.20.4.7. ACCOUNTS WING

1. Wherever it has not been done, the DRDAs should shift over to commercial accounting system from the existing government system. They should publish an annual report along with the balance sheet. The accounts wing of the DRDA should be headed by a Sr. Accounts Officer, either on deputation or by engaging the services of a chartered accountant. He should be supported by an Accounts Officers each for self-employment programmes and wage employment

programmes duly assisted by accountants. Wherever the Watershed programmes (IWDP/DPAP/DDP) are under implementation, and additional post of Accounts Officer may be sanctioned. For Indira Awaas Yojana, one Accountant at the District level should be available to monitor the progress of the programmes and the accounts.

2. One of the Accounts Officers should perform the role of internal audit.

2.20.4.8. MONITORING WING

There should be a separate Monitoring and Evaluation wing headed by a Project Economist and functioning directly under the supervision of the Project Director. Apart from the monitoring the progress of all the programmes, this wing should also carry out evaluation/impact studies regularly by independent institutions/experts including NGOs. The cost of such studies will be met from the respective programme funds. This wing should also monitor issues relevant to poverty in the district.

2.20.5. ADMINISTRATIVE COST

1. Administrative costs were earlier admissible under different programmes. In order to enable the DRDAs to develop a proper personnel structure and to ensure its proper growth over years, the practice of meeting the administrative costs as percentage of each programme allocation has been given up. It will, on the other hand, be taken up as a new scheme called 'DRDA Administration' with effect from 1st April, 1999. This scheme will be funded on a 75:25 by the central and state government.
2. Till 31.3.99, administrative costs of the DRDAs were being met by way of a part of the programme fund of IRDP, JRY, EAS, DPAP, etc. With the introduction of the scheme of 'DRDA Administration' the administrative costs earlier available under different programmes stand withdrawn from 1.4.1999 and provision of administrative support to the DRDAs will be only under the scheme of 'DRDA Administration'.
3. Since the salary structure in different States is different, the States may follow their own salary structure. However, the administrative costs ceiling fixed should be strictly adhered to. Any increase over and above the ceiling should be met entirely by the State Government.

4. A maximum of 30% of the salary cost may be allocated towards contingencies inclusive of Rents, POL, office expenses, etc.
5. The administrative cost per district is fixed as follows:
   Category A districts (<6 blocks) Rs. 46 lakh per year
   Category B districts (6 - 10 blocks) Rs. 57 lakh per year
   Category C districts (11 – 15 blocks) Rs. 65 lakh per year
   Category D districts (>15 blocks) Rs. 67 lakh per year
6. The above limits will be applicable from the year 1999-2000. This ceiling will be raised every year, on a compounding basis, upto 5% to set off the increases due to inflation etc.
7. The State Governments are allowed a sum upto 10% of the above costs, to be calculated at 10 % of the total admissible cost to all the districts in the state.

2.20.6. STAFF PATTERNS

Sl. No.	POSTS	No of Posts			
		Category A	Category B	Category C	Category D
Project Management					
1	Project Director/CEO	1	1	1	1
Self Employment Wing					
1	Project Officer	1	1	1	1
2	APOs	2	2	3	3
3	Technical Assistants	2	2	3	3
4	Clerk-cum-Typist/Typist	2	2	3	3
Women's Wing					
1	APO	1	1	1	1
2	Technical Assistants	1	1	1	1
3	Clerk-cum-Typist/Typist	1	1	1	1
Wage Employment Wing					
1	Project Officer	1	1	1	1
2	Technical Assistants	1	1	2	2
3	Clerk-cum-Typist/Typist	1	2	2	2

Watershed Wing					
1	Project Officer	1	1	1	1
2	Technical Assistants	1	1	1	1
3	Clerk-cum-Typist/Typist	1	1	1	1
Engineering Wing					
1	Executive Engineer	1	1	1	1
2	Assistant Engineer	1	2	2	2
3	Technical Assistants	1	2	2	2
Finance Wing					
1	Senior Accounts Officer	-	1	1	1
2	Accounts Officer	2	2	2	2
3	Accountant/Accounts Clerk	3	3	4	4
4	Clerk-cum-Typist/Typist	1	2	2	3
Monitoring Wing					
1	Project Economist	1	1	1	1
2	Statistical Investigator/ASO	1	2	2	2
3	Clerk-cum-Typist/Typist	1	1	1	1
General Administration					
1	Superintendent/Office Manager	1	1	1	1
2	Assistants	2	3	3	3
3	Stenographer	1	2	2	2
4	Drivers	1	2	3	4
5	Attendant/Watchmen	3	4	5	6

2.20.7. FINANCIAL PROCEDURES

1. The Scheme of 'DRDA Administration' shall be a centrally sponsored scheme. The funds required under this programme shall be shared between the Centre and the States in the ratio of 75: 25. Funds will be released directly to the DRDAs, in accordance with the guidelines under this programme.

2. The Centre will release funds in two installments.

2.20.7.1. RELEASE OF FIRST INSTALLMENT:

a. The release of first installment can be made without any formal request if the second installment in the previous year had been released without any condition. If latter installment was not released at all or was released with some conditions, formal requests for release of first installment are required from the DRDAs after the conditions have been fulfilled/reasons for non-release of the second installment have been met. For the first year i.e. 1999-2000 all the DRDA will be released first installment on an ad-hoc basis.
b. The release of the first installment should ordinarily be completed by the end of the second month of the financial year.

2.20.7.2. RELEASE OF SECOND INSTALLMENT:

The quantum of the second installment shall be subject to actual requirement within the overall ceiling. The second installment of Central funds shall be released on the request of the DRDAs in the prescribed proforma on fulfillment of the following conditions:

1. Budget provision for the current year may be indicated by the State Governments. The Central release will not exceed it proportionately.
2. The State Government should have released its contribution during the previous year. Deficiency in release of its share will be deducted from the second installment. Also the contribution of the State Government for the first installment of the current year should have been released.
3. Available funds including carry forward funds should have been utilised at leased to 60 %.
4. The opening balance of the DRDAs should not exceed 15% of the allocation of the year in which funds are being released. In case, the opening balance exceeds this limit, the Central share of the amount by which it exceeds this limit will be deducted at the time of release of second installment.

2.20.7.3. MAINTENANCE OF ACCOUNTS

Separate accounts shall be maintained of this scheme and each other scheme under which the DRDA receives funds. Such maintenance of accounts is governed by the principles that the expenditure incurred is not repugnant to the objective of the scheme and is made, in accordance with the prescribed procedures. DRDA accounts are to be maintained on double entry system. The accounting procedure for DRDAs has been described in detail in the Government of India, Ministry of Rural Development Publication entitled "Revised Accounting Procedure for District Rural Development Agencies/Societies', 1984 and subsequent instructions issued / to be issued from time to time. [27]

3.1 GENERAL:

To understand the process of preparing regional planning database using GIS, it will be beneficial to study the similar work done earlier in the same field. Some research papers and projects related to the topic have been studied to understand the process thoroughly. Three case studies dealing in different aspects of GIS application related to regional planning are taken.

3.2 RATIONALE FOR SELECTION OF THESE STUDIES:

First study named as ***National (Natural) Resources Information System (NRIS)*** is about resources availability, utilization, and social and physical infrastructure development at district level. NRIS is being extensively used to provide development planning support with specific reference to rural development specifically***: Identification of drinking water sources for flourosis affected villages, Identification of villages not having educational facilities, Identification of priority villages for providing road connectivity*** etc.

The second study entitled as ***Spatial Decision Support System using GIS based Infrastructure: Planning in Health & Education for Ranchi District***, emphasizes the power of GIS technology to better understand and evaluate spatial data using information stored in the database for social infrastructure development. ***It provides the planners an accurate spatial view of the district at district, block, and village level as well as road, rail and drainage network etc. and to assists the planners in finding out the possible locations for the schools and health centers depending on several parameters such as for health; population density, number of health centers required and its optimum location, number of disease infected persons etc. and similarly for education; percentage literates, number of primary schools and middle schools required and its optimum location, number of teachers posted, vacancy and required as per norms etc. in a village.***

Third study deals with low cost GIS software ***"PRAGATI"*** developed by Gujarat Geographic Information System (GGIS). With the help of this, ***village, block and district***

level data regarding demography and amenities related to health, education, irrigation etc. can be obtained at a few clicks. Mathematical and logical queries based on various attributes also can be carried out. ***Complete information about a village can also be obtained by just clicking on the map.*** The software has been installed at all the districts of Gujarat state with relevant training to District Planning Officers and others who are involved in decision-making.

The fourth study titled as ***District Information and Planning System (DIPS),*** aimed to design a computer package for resource analysis and management taking case study of a district. This package captures data from all sources and then analyses and plans in an efficient and simple manner. ***It also helps user to analyze and the resources of the village / block / district in an efficient but simple manner.*** It Analyses the present distribution and utilization pattern of resources and suggests plan for optimum utilization in future. It bridges the gap between planners and computer professionals can be used for any district of the country.

3.3NATIONAL (NATURAL) RESOURCES INFORMATION SYSTEM (NRIS): *CASE STUDY*

This study is down loaded from gisdevelopment.com internet website, and this paper is written by A. R. Das gupta, Deputy Director, Satellite Communications and II Applications Area and R. K. Goel, Head, Informatics Applications Division Space Application Centre (ISRO), Ahemdabad (rkgoel@jpdpg.gov.in). This is a government programme launched by the Department of Space (DOS) jointly with the State Remote Sensing Centers. [21]

3.3.1 INTRODUCTION:

NRIS is visualized as a network of GIS based nodes covering resource information in the spatial domain. ***System encompasses information on natural resources related to land, water, forests, minerals, soils etc. and socio-economic information such as demographic data, amenities, infrastructure etc. The integration of these sets of data would aid the decision making process for systematic resources utilization and also aid sustainable development goals of the country.*** During Interim Phase of NRIS, 30 selected Districts from 17 States have been covered at 1:50,000 scale.

The ultimate end users of the NRIS system are expected to be the planners and decision makers, experts in their respective areas/ disciplines, who need not be the experts in the technologies like GIS and Remote Sensing. The mechanisms for access of the database elements are therefore made easy and explicit. The inputs for NRIS are from different sources in a variety of formats including spatial as well as non-spatial form at various levels of details vis-à-vis the scales and the spatial units of observance. The diversity and the complexity of the various data elements, the decentralized and distributed implementation/ usage of the databases and the need for easy and explicit database access mechanisms called for a systematic study for arriving at baseline design standards, which incorporate:

- The standards for easily usable Database Query and Decision Support shells for enabling the usage of the NRIS system by the planners and decision-makers themselves directly.

On the one hand NRIS facilitates standards/ protocols/ procedures for database creation/ organization, updating and database access using appropriate GIS and other software packages, but also includes customized shells for decision support. These shells focus on providing the user a transparent access to the database and software package environments and address the user specific planning problems. The shells are customized based on the analysis models specified by the users and the customization tools provided within the GIS.

3.3.2 NRIS ELEMENTS:

3.3.2.1 The Databases:

The NRIS node databases consists of integrated spatial/ non-spatial data elements comprising of the map inputs from remote sensing as well as conventional sources and village-wise non-spatial data on socio-economic and infrastructure aspects. The database is designed and organized in a manner such that it minimizes the data redundancy and maximizes the multiplicity of usage of each data element. A summary list of the data elements is as follows:

- Land-use / cover
- Geomorphology
- Lithology & Geological Structures
- Soils Taxonomic Classification & Profile
- Drainage/ canals
- Elevation Contours/ Spot Heights
- Watersheds
- Taluk/ Block Boundaries
- Village Boundaries/ Settlements
- Forest Management Boundaries
- Well Locations/ Well log data
- Road / Rail Network
- Meteorological Observations
- Demography/Occupation
- Village Amenity availability (Education, Medical, Communication, Power)
- Land Utilisation Statistics

- Slope Classes
- Ground Water Prospects
- Land Resources Development Plan
- Water Resources Development Plan
- Land Capability for Agricultural Use
- Soil/ Land Irrigability

3.3.2.2 Query and Decision Support Shells:

The ultimate end users of the NRIS system are expected to be the planners and decision makers, experts in their respective areas/ disciplines, who need not be the experts in the technologies like GIS and Remote Sensing. The mechanisms for access of the database elements are therefore made easy and explicit. ***On the one hand NRIS facilitates standards/ protocols/ procedures for database creation/ organization, updating and database access using appropriate GIS and other software packages, but also includes customized shells for decision support.*** These shells focus on providing the user a transparent access to the database and software package environments and address the user specific planning problems. The shells are customized based on the analysis models specified by the users and the customization tools provided within the GIS and other packages. The Query and Decision Support Shells consists of the generic query components and various problem specific decision support components.

Generic query shell: provides an easy to use, menu based access mechanism in point and shoot mode for making integrated query on all aspects (i.e. natural resources, socio-economic and infrastructure) in a single environment. ***It offers appropriate menus, graphic screens and icons to a user for specifying query in various modes like what lies here, where lies this, theme surface, criterion surface, reference, spatial window and on-the-fly the generation of user specific index.*** The shell also presents different user (spatial and functional) views of the database in user terminology, provides an illusion of seamlessness on the horizontal spread of the data base contents and keeps a user free about where and what of the data base elements in the computer storage.

Problem Specific Decision Support Shell (SDSS): facilitates selection of the best course of action based on pre-declared objectives, decision rules and constraints. It also facilitates

modification of the decision rules and navigation of the solution space in an interactive, iterative and integrative environment.

3.3.3 DEMONSTRATED APPLICATIONS:

NRIS is being extensively used for generating the integrated land and water development plans as well as to provide development planning support with specific reference to rural development. Some of the demonstrated case studies in this context include:

- Identification of drinking water sources for flourosis affected villages.
- Demarcation of the regions having high potential for dairy development
- Prioritization of micro-watersheds for implementing development schemes.
- Identification of villages for placing new schools
- Identification of priority villages to be taken up for development under Ambedkar Yojana
- Identification of check-dam sites for rainwater harvesting
- Identification of areas suitable for aforestation for integrated forest development
- Decision support system for fertilizer management and distribution.
- Plan for reclamation of salt affected lands.
- Priority villages for providing road connectivity.
- Priority villages for locating middle schools and for providing road connectivity.

3.3.4 DESIGN CONCEPTS:

The major areas of concern addressed while evolving the NRIS Node Design and Standards were:

- Decentralized and distributed strategy for database implementation.
- Complexity and variability of input data formats.
- Nation-wide spread of the spatial framework of databases.
- Minimization of database redundancy and increasing the data integrity.
- The database quality controls.
- End-user profile calling for independent development of applications facilitating explicit and transparent access to the databases and for planning and decision support.

3.3.5 DECENTRALISED IMPLEMENTATION STRATEGY:

NRIS is being implemented on a nation-wide scale by a number of agencies, which are geographically spread all over India. Furthermore, these agencies represent a variety of specialization in implementation of GIS and Remote Sensing based information systems. These include

- State Remote Sensing Centres, with expertise in Remote sensing applications and exposure to GIS. These centres are placed in the state headquarters, and are the nodal agencies for realizing and managing the NRIS nodes for the districts falling in state purview.
- Various centres of ISRO-DOS geographically spread all-over India. These centres are entrusted with the task of database design, database organization, data quality assurance and applications s/w development.
- Private entrepreneurs from all-over country who were initially entrusted with the task of analogue to digital data conversion and are progressively getting ready to take-up up the development of turnkey systems.

3.3.6 INPUT DATA VARIABILITY:

The inputs for NRIS are from different sources in a variety of formats including spatial as well as non-spatial form at various levels of details vis-à-vis the scales and the spatial units of observance. All these had to be brought to a common framework in order to realize the seamless and integrated database.

3.3.7 NATION-WIDE SPATIAL FRAMEWORK:

NRIS is visualized as multi-tier network of spatial databases. The obvious requirement is for access of spatial databases across various nodes involving bottom-up, top-down and horizontal data transfers. Moreover, the components of the system had to be implemented through a variety of agencies spread all-over country. Such a requirement raised various design and standardization issues. The solutions has to comply various requirements as follows:

- Ability of the system to represent database features within acceptable limits of accuracy at different levels of details i.e. Centre, State & District.

- Ability of the system to facilitate across node data transfers in a seamless manner. This would include data transfer from States to Centre, Districts to State and District to District.
- Ability of the adoption of the scheme for easy and transparent implementation using standard GIS S/W tools on all the NRIS nodes. This is important because, the database creation will have to be done through private entrepreneurs using standard GIS S/W tools. Any proprietary restrictions associated with the selected scheme will act as a bottleneck.

3.3.8 FEATURE CODIFICATION SCHEMES:

As listed above, the NRIS Node databases cover various aspects including natural resources, manmade resources and socio-economic backdrop of the area concerned. These include

- Input elements based on mapping & digitisation of themes from Remote Sensing viz. Land-use/ Land-cover, Geomorphology, Lithology & Structures, Ground water prospects, Soils and Drainage etc.
- Control/ Reference Layers from Survey of India (SOI) toposheets including administrative boundaries like states, districts and taluk/block, Elevation contours and spot height points, Transportation network including roads and railways, Hydrological network including drainage, rivers, canals, well locations etc.
- Layers from other collateral sources including village boundaries and settlement locations from census maps & revenue maps, soils data and other natural resources data from various line departments.
- Non-Spatial data on demography, economic status and village amenities available at village level in tabular form from census department, National Informatics Centre and State Beauro of Economics & Statistics (BES).

Each of these aspects has its own requirement for digital conversion prior to creation and organisation of NRIS node databases.

3.3.9 TRANSPARENT AND EASY ACCESS MECHANISMS:

Design of NRIS had to recognized the fact that the effective use of such a system will be possible only when the system can be accessed directly by the planners and decision makers who are the experts in their own respective fields of activity, specifically in the problem solving domain. In order to be able to use such a complex and technology heavy system, end user would have had to not only possess complete understanding of the problem in hand, but also the:

- Full understanding of the capabilities of the GIS, which in itself could be a combination of multiple software packages; high level of proficiency vis-à-vis usage of GIS system along-with the related software packages. This would include system commands and sequencing the commands.
- Complete knowledge of the details of the underlying database, including the database design, reference details of the database elements and the relationships amongst the various data elements.

It would have been be highly unreasonable to assume that the real planners and decision-makers would have sufficient time to be able to attain full expertise on the above aspects in the technology domain. ***NRIS had to be therefore conceptualized, designed and implemented in a manner that not only it facilitate database creation/ organization, updating and access using appropriate GIS and other software packages, but also includes customized shells for decision support.*** These shells focus on providing the user a transparent access to the database and software package environments and address the user specific planning problems. The Query and Decision Support Shells consists of the generic query components and various problem specific decision support components.

The task of developing such access shells was also decentralized and could be possible due to the fact that the database design and standards had been already specified.

3.3.10 CONCLUSIONS & FUTURE WORK:

NRIS in the initial phase has clearly demonstrated the possibilities of creating digital databases for selected districts and proved its utility for the State/District administration in a decisive manner. ***The ultimate scope of the project is to create digital databases for all the states and union territories of the country and provide remote access to the NRIS databases and decision support systems under the web technology framework.*** With the

growth in the technology it is now found feasible to implement web-GIS technology, which would be a cost-effective and most amicable solution for the State Governments. The major focus of the future NRIS mission would therefore be to:

- Create state level databases for entire country
- Provide web access to these databases and the front-end decision support systems for use by the users at district/ block level. In this context, various alternative technologies are under scrutiny.

3.4 SPATIAL DECISION SUPPORT SYSTEM USING GIS BASED INFRASTRUCTURE: Planning in Health & Education for Ranchi District: *CASE STUDY*

This study is based on the research paper available on gisdevelopment.com internet website. This paper is written by:

Mili Ghosh, M. Tech Student, Dept. of Remote Sensing BIT Mesra, Ranchi. milighosh2001@yahoo.co.in

Shantanu Lal, M. Tech Student, Dept. of Remote Sensing BIT Mesra, Ranchi. shantanulala@rediff.com

Dr. M. S. Nathawat, Prof. & HOD, Dept. of Remote Sensing BIT Mesra, Ranchi. msnathawat@yahoo.co.in **[22]**

3.4.1 INTRODUCTION:

In a developing country like India where 73% of the population resides in rural area and 27% in urban areas, we need a very structured planning procedure such that the development activities and infrastructure facilities are available at both urban and rural area. However, in such a condition where majority of people leave in rural area and are provided with the least infrastructure facilities, creates a regional imbalance in development, causing shift in population from rural to urban areas. Hence administrators or decision-makers require an efficient GIS based tool, which will assist them to get the updated scenario of the region.

The present study emphasizes the power of GIS technology which will help the state government of Jharkhand to better understand and evaluate spatial data by creating graphic displays using information stored in the database ***As GIS does more than just display the data; it enables the user to dynamically analyze and update the information linked to those locations spatially and can further strengthen the e-governance.***

Ranchi district was taken as a case study covering all the 20 blocks with 2154 villages. The administrative maps were digitized and non-spatial attribute data, prepared on MS-Excel, were incorporated to each of the villages in spatial data. In the present study two prime parameters – health end education were taken as a model to demonstrate the GIS based e-governance. Similarly other amenities can also be linked and a holistic analysis of

the regional development can be found out. ***The purpose of this study is to locate existing health and education facilities and indicate upgradation /new creation of such facilities require as per the norms.*** An interface was customized where the user can query on the datasets to retrieve tabular and spatial information. Provision is made for hosting the maps on the Internet in such a way clients can view the information query using Arc explorer.

3.4.2 OBJECTIVES:

- To provide the planners an accurate spatial view of the district at different levels such as district, block and village level as well as road, rail and drainage network etc.
- To provide the planners detailed demographic data and education & health related data on desktop in a GIS environment.
- To assists the planners in finding out the possible locations for the schools and health centers depending on several parameters such as for health; population , no. of health centers required and its optimum location, no. of disease infected persons etc. and similarly for education; % literates, no. of primary and middle schools required and its optimum location, no. of teachers posted required as per norms etc. in a village.

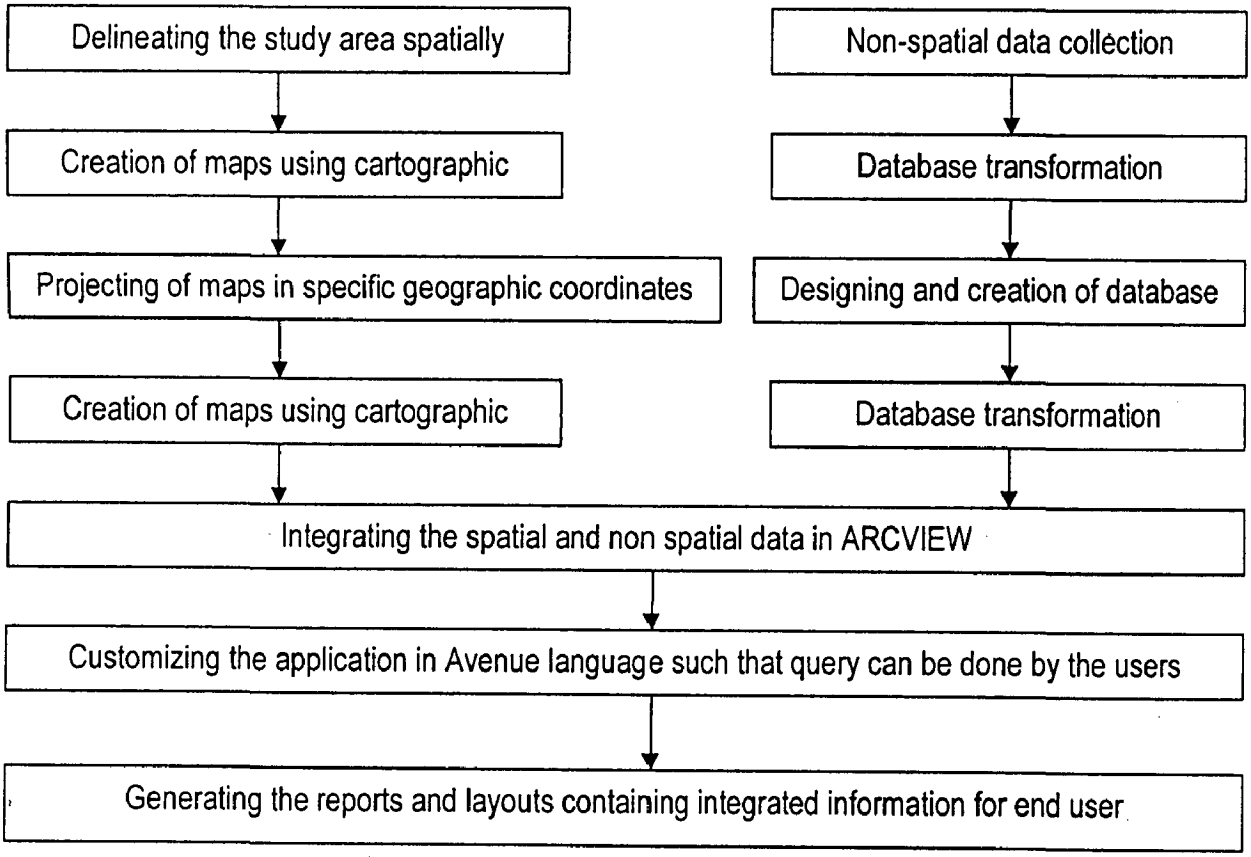


Figure 3.1: *Flow Chart.*

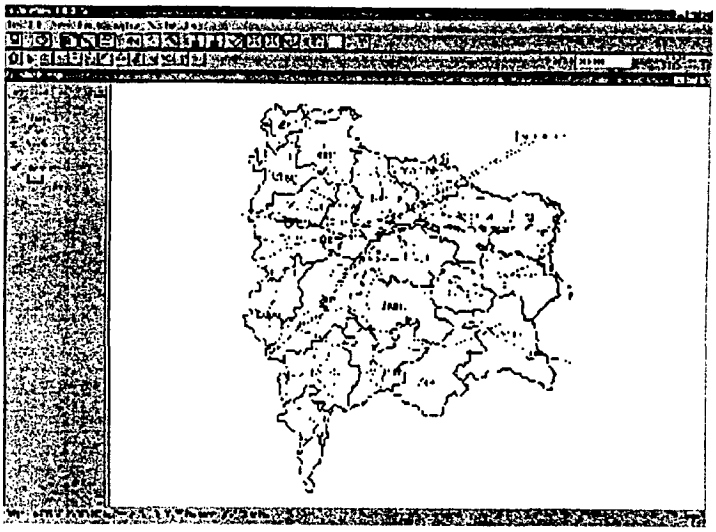


Figure 3.2: *Block Map of Ranchi District*

3.4.3 STUDY AREA:

Ranchi district is situated in Chotanagpur plateau. Chotanagpur is a vast undulating plateau studded with hills, which were once covered with dense forests, but with influx of population, rapid industrialization and extensive mining the forest cover has decreased. Ranchi district of Jharkhand has been selected as a case study.

Table 3.1: Demographic profile of study area

Item	2001	1991
Total population	2783577	2214048
Total male	1436423	1152736
Total female	1347159	1061312
Population density (per Sq. Km)	362	288
% Literacy	66	52
% Male Literacy	78	65
% Female Literacy	53	37
Total SC	-	123239
Total ST	-	964422
% ST	-	43.56

3.4.4 METHODOLOGY:

First of all study was done for defining and understanding the current problems regarding health and education in Jharkhand state. In order to achieve the objective set, the following methodology was adopted.

3.4.5 ADMINISTRATIVE SETUP:

Ranchi district is comprised of one sub-division and, 20 community development blocks. It has 9 towns and 2057 villages (2038 inhabited villages and 19 uninhabited villages).

3.4.6 SOCIO-ECONOMIC SET-UP:

Ranchi is basically a tribal belt. The main tribal groups residing here are the –Mundas, Oraon, Kharias, and Birhore. The district can be divided into five distinct linguistic cum social zones as follows:

- Panch Pargania areas.
- Isolated Mandari speaking areas.
- Church influenced areas.
- Urban areas.
- Areas having sizeable Muslim population.

3.4.7 SPATIAL DATABASE DESIGN & ORGANIZATION:

- Delineating the study area spatially.
- Identification and collection of spatial data consisting of SOI Toposheets of 1:250,000 scale and maps from Census-handbook.
- Creation of maps using cartographic techniques.
- Creation of digital maps using Arc/Info software, which involves
    - Digitization of scanned maps.
    - Performing clean build operation to create topology.
    - Projection and transformation of coverage into real world co-ordinates following the same projection system as adopted by SOI Toposheets i.e. Polyconic Projection and choosing spheroid as Modeverest.

3.4.8 NON-SPATIAL DATABASE DESIGN AND ORGANIZATION:

- Identification and collection of non-spatial data elements consisting of
    - Census-data of 1991 in digital form.
    - Educational data (2001) containing information about number of Primary schools, Middle schools in each of the village, number of teachers and students etc. in hardcopy from offices of District

Commissioner of education, Ranchi and in softcopy from office of Bihar Education Project, Ratu block HQ, Ranchi.

- Health related data of year 2001 containing information about number of PHC, PHSC, APHC, and Referral hospital etc. from Civil Surgeon Office, Ranchi. Malaria related data from State malaria Office, Jharkhand, Ranchi.

- Editing the non-spatial data attributes.
- Transformation of all data obtained in a suitable standard digital form i.e. dbase files such that it is compatible.
- Design and Organization
  - All the non-spatial data obtained from different sources are organized following a district-Block-Village hierarchy using MS-Excel software.

3.4.9 LINKAGE OF SPATIAL AND NON-SPATIAL DATA:

GIS allows the linkage of spatial and non-spatial data based upon a defined relationship. A one to one relationship can be defined for each of the spatial entity with the non-spatial data. For performing the linkage operation the following steps were done:

- Identification of relation between spatial and non-spatial data such as one-to-one relationship between each of the village entity with non-spatial data for them.
- Selection of key field as linkage item which may be Census-code, polygon – id obtained after topology creation in Arc/Info or self-generated code.
- Linkage has been done in Arc View 3.2a environment of the Arc/Info coverages, as they are easily accessible through ArcVeiw by performing Join operation.

3.4.10 METHOD OF ANALYSIS:

In a GIS based system any analysis can be done and its output can be shown in a much better way only by integrating non-spatial data with spatial data. The core of all analysis is:

- A combination of different parameter whether spatial or non-spatial.
- Derivation of mathematical indices from non-spatial data and representing them spatially.

In present case our main emphasis was to derive such indices which reflects the level of infrastructural development of each village, identifies the gaps so as to be taken up for development considering two basic amenities education and health.

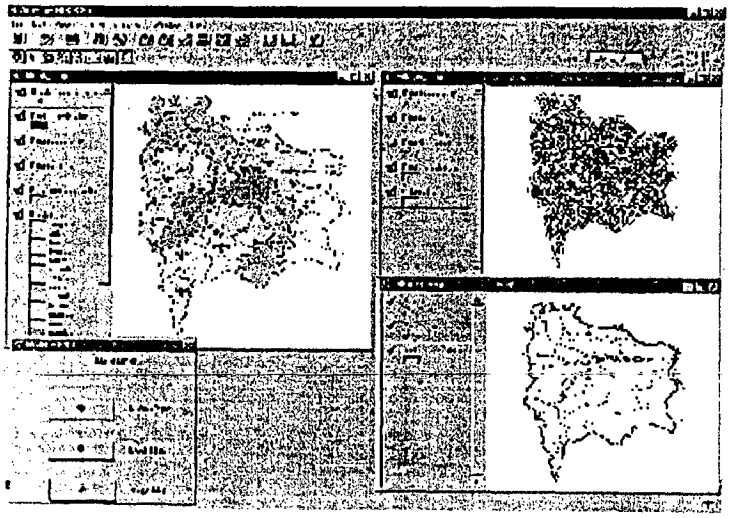


Figure 3.3: *Customized interface in ArcView*

Simultaneously we also analyzed whole district in the light of ***Intra District Disparities***, which includes –

- Population density.
- % SC/ST Population.
- % Literacy.
- % Distribution of workers.
- % Distribution of non-workers.
- % Distribution of agricultural workers.
- % Distribution of workers involved in Mining and Quarrying.
- % Distribution of Marginal worker.
- % Distribution of Trade and Commerce workers.
- % Distribution of Transport, Storage and Communication workers.

Finally considering all above mentioned parameter Village Development Index was calculated.

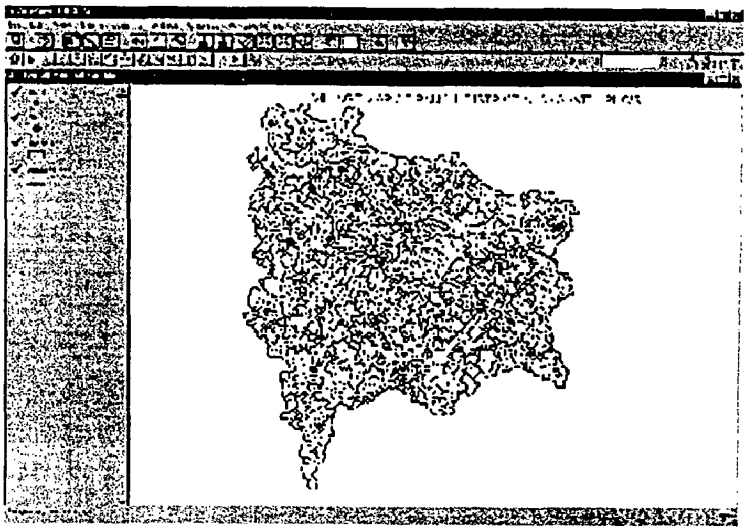


Figure 3.4: *Village Map of Ranchi District along with PHC locations*

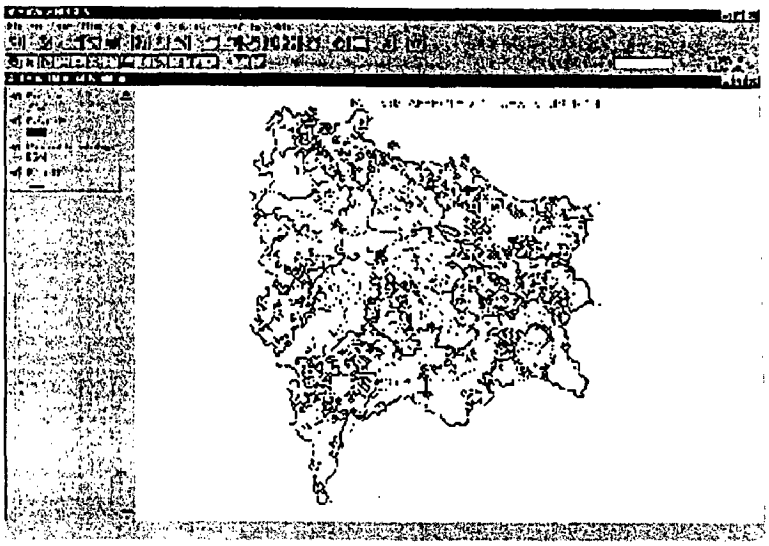


Figure 3.5: *Malaria affected places of Ranchi District along with drainage map*

Figure 3.6: *Map of Ormanjhi block with Health facilities & Malaria affected areas*

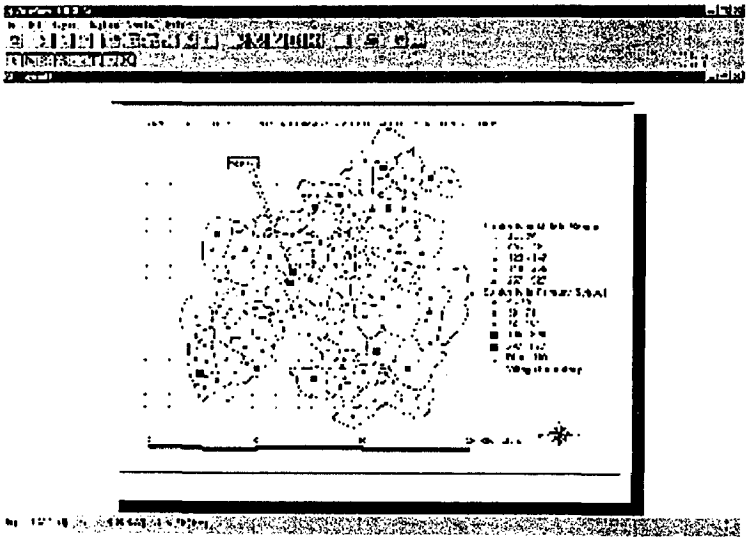


Figure 3.7: *Map of Torpa block with Education facilities & range of no. of students*

3.4.11 CONCLUSION:

The newly created state Jharkhand, whose capital is Ranchi (our study area), is tribal dominated state having immense potential for developmental activities. For overall development, first we have to concentrate in providing the basic amenities such as health, drinking water, electricity and primary education. Hence our SDSS is effective and satisfies the stated objective in the field of health and education. ***The village and block level maps showing several demographic related data, along with current status of health and education will help the state government for better governance. If all or most of the state departments join hands in a combined effort to implement GIS based system, then it will be a big leap towards e-governance for a new state like Jharkhand.***

However the SDSS can be amplified much more by incorporating Remote Sensing and GPS technology. Also to make it more comprehensive, more and more data from all the government departments where computerization is in progress can be integrated at village / block level.

3.5 PRAGATI: A Low Cost GIS Based Decision Support System: *CASE STUDY*

This study is taken from internet available on website gisdevelopment.com. it uploaded on internet by: S. A. Sharma, Sr. Scientist (skant_65@yahoo.com) and Mitesh Patel, Paritosh Shukla, T. P. Singh, Remote Sensing and Communications Centre (RESECO), Gujarat.

This paper is discussed about a low cost GIS based package "PRAGATI" developed using Java and MS-Access by Gujarat Geographic Information System (GGIS). **[23]**

3.5.1 ABSTRACT:

To facilitate transparent and rational planning at district level, it is pertinent to have a Decision Support System (DSS). As a strategy to provide DSS at district and taluka level in Gujarat state, Gujarat Geographic Information System (GGIS) was envisaged for grass root level planning. PRAGATI – Low cost software developed using Java and MS-Access, can run on any PC with minimum configuration and does not require any costly GIS software. Village level data regarding demography and amenities related to health, education, irrigation, infrastructure etc. are available at a few clicks. Mathematical and logical queries based on various attributes can be carried out to get the desire results. Complete information about a village can also be obtained by just clicking on the map. The village level information can be obtained at district or taluka level for Gujarat State. Any other village level data can be further integrated with 'PRAGATI' and on-line help is available for the users. The village level information can also be obtained at parliamentary or assembly constituency level. The various outputs can be printed in a hard copy or can be exported to jpeg format for presentation. Thus a particular map can be easily availed at very low cost. The software has been installed at all the districts of Gujarat state with relevant training to District Planning Officers and others who are involved in decision-making.

3.5.2 INTRODUCTION:

GIS or spatial IT is a covetous area in the field of Information Technology. GIS has grown within the last few decades and efforts at national level as well as state level has resulted in to creation of geospatial datasets. These spatial datasets are needed not only by the creators of datasets but a much large community of grass root decision makers, policy

makers, academics, research organizations etc. Today our decision makers sieve through a large amount of information. For dispensing their needs and also to facilitate transparent and rational planning at district level, it is pertinent to have a Decision Support System (DSS), which is economically viable, user friendly, and has customizable spatial dataset. In Gujarat it is evident to have a paradigm shift to filter complicacies for the GIS to be user friendly. Here is one such approach done at Remote Sensing & Communication, Centre (RESECO) Gandhinagar, which initiated as Gujarat Geographical Information System and is popularly known as "Pragati". The software Pragati was developed under NRIS program.

3.5.3 ABOUT "PRAGATI":

PRAGATI is low cost, java based platform independent GIS software, used for depiction and analysis of various data at Village, Taluka or District level to serve as DSS. The software is Windows based, customizable software package, which can be used as DSS with spatial approach. It can display various geospatial layers; can accept user defined non-spatial datasets to generate maps based on it. It can also generate maps based on complex user queries.

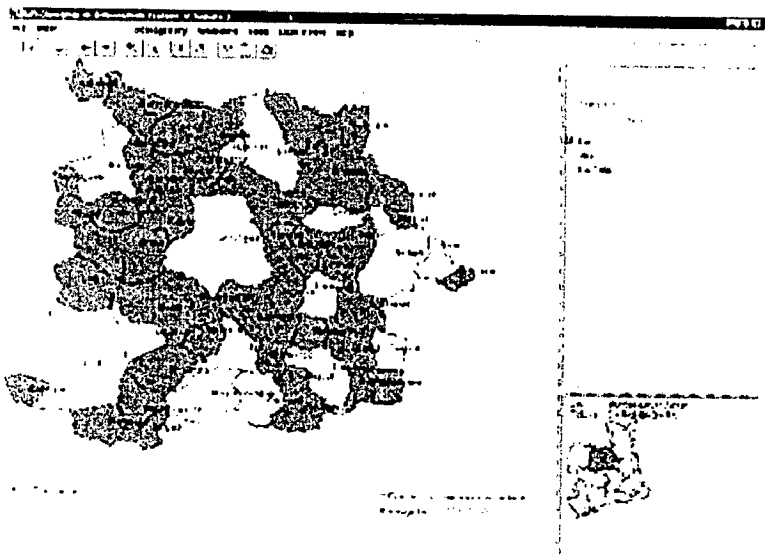


Figure 3.8: *The map of a Taluka showing the availability of schools within a village*

3.5.4 SOME SALIENT FEATURES OF "PRAGATI":

PRAGATI is user-friendly software with Menu/Tool Button Driven access. It enables one to generate complex queries from non-spatial datasets and also display results of it on spatial datasets (maps), as shown in figure-2. For this a Smart Query Generator dialog box

is provided, which guarantees that queries generated from it will be syntactically true, so that user does not need to worry about SQL Syntaxes. Software has also got parser which will check the generated query and will prompt the error message if it finds some error (indicating the place of error) in syntax of the input query and it also will display the results of query in the spatial form (on map) with selected entities filled with different color.

Some other salient features of the software are:

- Zoom In, Zoom Out, Pan the map without distorting shape or information of it.
- Linking of any nonspatial data to spatial data the user has.
- Built in facility for customizing views and the ranges of classes for classification.
- Printing of both spatial and non-spatial datasets is possible. Spatial data will be printed in the graphical form where as nonspatial datasets will be printed in tabular form.
- One can also export current theme in the JPEG format.
- Measurement of aerial distance between any two points on the map.
- One can also import shape files with all its data.

3.5.5 USERS OF THE SOFTWARE:

"PRAGATI" software has been installed and is successfully being used by District Planning Officers and District Statistical Officers of the state and others who are involved in decision-making.

3.5.6 PRAGATI FOR PLANNERS:

The planners of district and taluka level like collectors, DDO, TDOS, have undauntable task of planning various national and state level rural development programmes, decide within the qualifying condition of various projects, satisfying the local needs. The software PRAGATI has been installed at the offices of all DPOs, Collectors, DDOs and other officers in the state. The response have been very good and because of the improved perception of this data the planning department has taken up the ardent task of developing very comprehensive database use and embolden the use of geospatial data in planning.

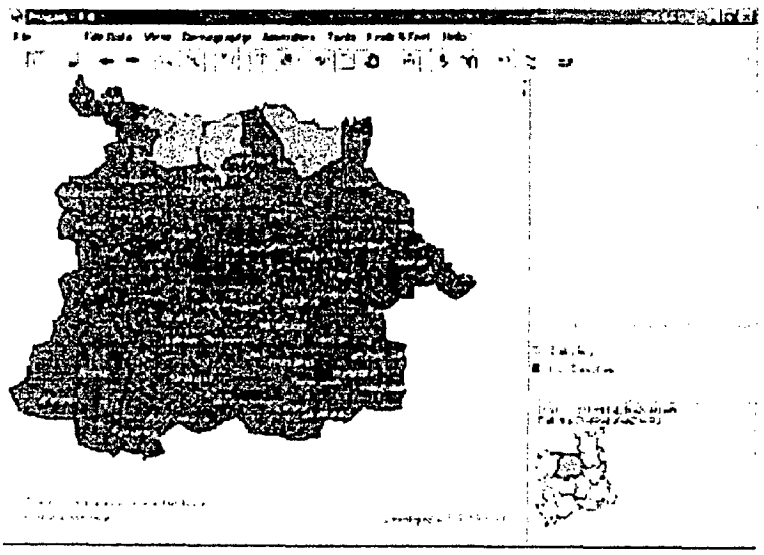


Figure 3.9: *Map of a Taluka showing location of villages*

There have been three specific applications custom delivered which are briefly described here after. Several other users are preparing their databases for the same.

3.5.7 THE FUTURE DOMAIN OF "PRAGATI":

The present version of PRAGATI can be further enhanced, keeping in mind the needs of the users. Some possible enhancements have been enlisted below.

- To support different projections.
- To generate some components in the form of java beans. So user can customize his software with it.
- To generate server-wise model so that number of users can use it simultaneously.
- To make it web enabled.
- To support other file formats.
- To overlay satellite images in background.

3.5.8 CONCLUSION:

The cost effective GIS solution at grass root level has been found to be very useful to the planners and decision makers. It has created self-reliance among a large number of people to use Spatial Information Technology for decision-making. The software developed is our modest attempt to facilitate the Decision Support System at grass root level.

3.6 DISTRICT INFORMATION AND PLANNING SYSTEM (DIPS) *CASE STUDY*

This research paper is prepared by Dr. Megha Phansalkar, Urban and Regional Planner, Micro Technologies Pvt. ltd., Mumbai, (drmegha@hotmail.com) and it is downloaded from internet available on gisdevelopment.com website. **[24]**

3.6.1 ABSTRACT:

District forms an important unit of study. District level planning is an area-based study aimed at supplementing the national and state plans. It implies evolving a developmental scenario consistent with the specific needs of the people, the growth potentials of the area and the budgetary allocations available. The task is of bringing about an effective functional linkage and coordination among various agencies for optimum resource utilization.

Computer has the capability of integrating the data from various sources. We have abundance of data with the district agencies. However, not much of this data is properly analyzed and effectively used for plan formulation and implementation. ***An integrated system is required where all the data is stored in a uniform format of all the departments and used for regular monitoring of projects, analysis and other district planning exercises. The study aimed to design a computer package for resource analysis and management taking case study of a district.*** It is a GIS (Geographical Information System) based application using primary /secondary and tabular / spatial data. The potential of computer model for strengthening the district planning process has been turned into reality by DIPS. It incorporates all the planning exercises required to be done by the district agencies / departments / research scholars. ***DIPS has three tier planning levels viz. village/ block and district. The package can be used for any district of the country.*** DIPS captures data from all sources and then analyses and plans in an efficient and simple manner. Thus it bridges the gap between planners and computer professionals.

3.6.2 INTRODUCTION:

Development planning is a process by which we try to achieve our objectives with the limited available resource. This means that we must select our objectives and set priorities in a rational manner. The planning process is, therefore, a process of decision making

about rational choices. Although ideally we should try to use resources in the best possible way to achieve our objectives, in practice we rarely do that especially at local level.

At the local level our objective are concerned more with the problems people face in meeting needs. The identification of these problems and the resources that could be utilized to solve those problems is critical to any planner. To answer the numerous questions the planner needs information/ data. The availability of data at the district and at the village level from different sources has increased beyond imaginable proportions. But the question is, are we using the data in a meaningful way? It is also obvious that we need to use different methods to analyze the data, apart from this the district planning now demand spatial perspective in view of fact that both the social and ecological commitments are to be taken into account. ***To make the task possible we need an information system with user-friendly interface, which can be used for data analysis by planner and other users.*** The success of planning process depends on the quality and quantity of the information available. It is therefore essential at this stage to device ways and means of organizing information, which can facilitate full exploitation of the relevant data to provide required information in a timely fashion. ***The information system, which facilitates systematic handling of data in derived formats, can play an important role in evolving alternative scenarios for natural resource development and management.*** Information flows from lower levels to higher levels, but often there is information overload, since the data is in pieces and not integrated. The success of integration depends on the quality and quantity of the information available. Although the current system of collecting the information has the advantage of being a vast and elaborate network, it suffers from the limitations like:

- Multiplicity of agencies generating similar but incompatible data sets in different format from the viewpoint of accuracy, resolution and methodology. Thus making it difficult to match and inter relate.
- Lack of regular procedure for updating the data periodically
- The methods of data storage not amenable to efficient and flexible retrieval of information.

This results in non-availability of relevant information in a friendly way to the planners or decision makers. ***On the whole the district computerization has enabled the information***

base to be significantly enlarged. The available data can be made easily accessible and operational at the planning stage, by the use of this system.

DIPS is a computer package which captures data and then helps user to analyze and the resources of the village / block / district in an efficient but simple manner. It Analyses the present distribution and utilization pattern of resources and suggests plan for optimum utilization in future. DIPS provides information in both textual and graphical formats and generates reports as per desire. Query system helps the user to retrieve data as per their requirements.

3.6.3 OBJECTIVES:

With a view to support various decision makers involved in decentralized planning the tasks envisaged to be carried out are as given:

- Utilize computer as a tool to design computerized integrate database using spatial and non-spatial data from both primary and secondary sources.
- Suggest methodologies for assessing resource utilization pattern, potentialities and plan for their optimum utilization
- Identify the target groups, stress areas and integrated projects that are relevant to the requirement of the people
- Prepare a computer package, which is user friendly, is replicable and can be used for any other district for decentralized planning

3.6.4 APPROACH:

The objectives to be fulfilled while planning for a district are very varied. The development of the society, with the uplift of the weaker sections has to be balanced. The study while suggesting the methodology for district planning has stressed on the unit of study and approaches to be incorporated.

Spatial Approach for the study of resources in terms of its utilization pattern, and planning for its optimum utilization with graphical and spatial tools. Sector approach for all major sectors like education, health, agriculture, industry etc. Basic minimum need approach for identification of living standards of the people. Target group approach for the weaker sections in the target area and lead sector approach to evolve an integrated development strategy for development of the local resources .

3.6.5 METHODOLOGY:

District resource planning is an elaborate exercise; it has to take into account the individual resource as well as the interconnectivity prevailing. It is a continuous and cyclic process that turns backing itself as a planning cycle. The different stages incorporated in the study are situation analysis, which analyses the resource, its utilization pattern and comes up with optimum utilization plans. The development analysis includes a trend analysis of the district development process, as well identification of problem and priorities for planning based on primary surveys. The last plan-programming phase evaluated the methods adopted for financial allocation between the Programmes and also suggests methodologies for program evaluation. Each phase has its own operations and outputs. The main tasks were

- Analyzing the distribution and utilization pattern of natural/human/financial resources and suggests plan for utilization in consideration with the requirements of the people.
- Identifying target groups, stress areas and integrated project that are relevant to the local resources and requirement of the people at village /block and district levels.
- Evaluating the project implementation in terms of its efficiency / adequacy/ requirements etc.

3.6.6 CONCLUSION:

It has been designed to be used by organization which are involved in resource planning, district planning agencies, training institutes for planning cause apart from generating a full fledged development plan for a district is provide solutions for the following questions: What are the data requirements for resource planning at the district level? How one should go about doing district planning? Which applying theories should be integrated while Analyzing data? What kind of empirical exercise can be done to analyze the district performance and plan for future? How to identify the gap the planning process How to plan for different sectors for optimum resource utilization and how to evaluate the performance of government programs.

Table 3.2 Application of GIS in Decision Making.

S No.	Sector	Planning Goal	Description
1.	Water Resources	Plan for utilization of water resource	• Access water resource availability/ utilization • Assessment of drinking water status.
2.	Land Utilization	Assess land characteristics and study land-use pattern	• Examine the existing land-use pattern and changes in the decade • Suitability analysis for agriculture use • Assessment of under utilization of land • Cropping pattern and crop productivity
3.	Forestry	Suggest measure of forest resource utilization	• Estimate area under forest • Identify major and minor forest produce.
4.	Agriculture	Assessment of agriculture development and plan for future development	• Assess population pressure on agriculture land • Assess present agriculture development index in terms of services and support system
5.	Livestock & Animal Husbandry	Suggest strategy for livestock development	• Analysis of present block-wise variation in livestock. • Assess dairy/ poultry in terms of produce and facilities and suggest plans for improvement. • Assess veterinary development index.
6.	Demography	Population growth analysis in terms of general social & economic aspects.	• Assess present population growth pattern. • Age-sex ratio, density pattern, rural urban ratio, occupational structure, literacy level & minority communities.
7.	Economic Profile	Analysis of existing economic development.	• Identify the base of economy of the district. • Assess per capita income. • Level of block-wise disparities in the level of economic development based on various parameters.
8.	Industrial Development	Plan for resource base industrial development.	• Assess industrial growth pattern • Suggest plan for utilization local resources
9.	Transportation & Communication	Plan for network of linkages between bloc head quarters	• Assess existing transport and communication facilities. • Propose transportation network based on settlement pattern.
10.	Human Settlement	Plan for spatial distribution of human settlement.	• Assessment settlement pattern. • Interconnectivity between settlements. • Improve physical framework with adequate provision of social services & economic infrastructure.
11.	Social Services; health, Banking Education, postal, etc.	Plan for hierarchical service center for infrastructure facilities.	• Identify the existing service centers classified into primary, secondary & tertiary centers. • Plan for additional service centers based on distance, population & other norms.
12.	District Development	Define an integrated development plan for the entire district.	• Integrate different sectors & suggest strategy for overall socio-economic development.

4.1 GENERAL:

Once the region emerges as an independent state the planning process will have to be initiated with renewed vigour on highly systematized lines to ensure that the desired goals are attained with minimum effort but to the maximum advantage to all. It is a well-known fact that the planning process can be facilitated with the ready availability of correct and appropriate data. If sufficient data, related to the various sectors of the economy are available when the new state comes into existence, it will serve as a benchmark to the planners. Besides this, availability of data on a time series basis will be extremely useful for setting realistic developmental targets over a given time period. It is, therefore, quite evident that a set of properly compiled data related to the different sectors of the economy will be a big boon to planners whether they are formulating short-term plans or working out a perspective plan for Uttaranchal State.

4.2 MACRO REGION PROFILE: UTTARANCHAL STATE

Himalayas are the highest and youngest mountain ecosystem in the world. These are spread across many country of Asia. In India, the Himalayas cover 14 states and 90 districts in two distinct geographical flanks of the western and eastern region the western Himalayan ranges extend from Jammu and Kashmir, Himachal Pradesh, Shiwaliks of Punjab, and Haryana, and Uttaranchal up to western border of Nepal. Uttaranchal state became a state under the Indian Union on 9th November, 2000. Previously it was known as hill region of Uttar Pradesh.

Uttaranchal has been described in the ancient texts as Kedarkhand and Kurmanchal. The history of the region is older than that of the Ramayan and Mahabharata. Of the two component cultural units, Garhwal was known as Kedarkhand, or the region of Kedarnath, and Kumaon as Kurmanchal, the land of the Kurmavatar.

Uttaranchal of today is the 27th state of the Republic of India (total states being 28). The State today with 13 Districts can be grouped into three distinct geographical regions, the High mountain region, the Mid-mountain region and the Terai region. The area under Terai is less than 15%, although more than 40% people live there. Only 12.6% of the

reported area of the hills is under cultivation, whereas 64 percent is declared as forests, the rest being mountains or under rivers, towns, etc. Of the total 34202 sq km of forests 52% is dense cover, with tree density being more than 40%. Of the total forests 70% is reserve forests under the administrative control of Forest Department, 8% under specially constituted van panchayats (elected Forest Councils), and the rest is open access, or village commons. After the creation of three-tier panchayat system in India in 1993 as a result of the 73rd Constitutional Amendment, open access lands are under the administrative jurisdiction of the village panchayats that are distinct from van panchayats.

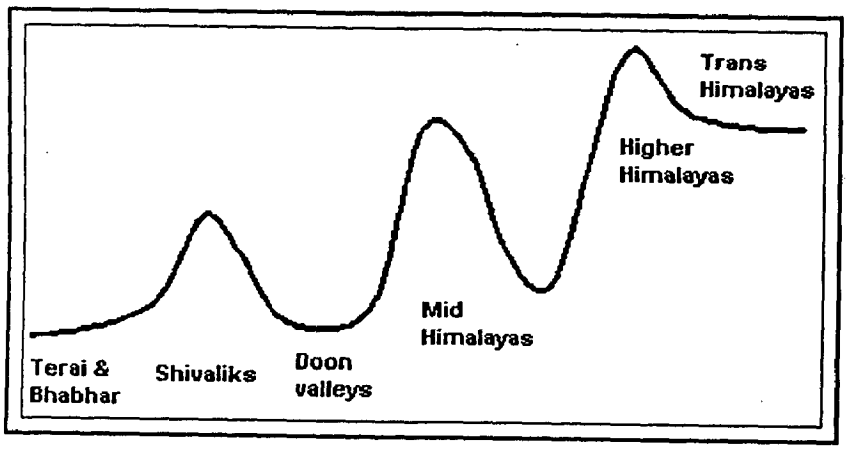
4.2.1 RESOURCE PROFILE OF UTTARANCHAL STATE:

Natural resources contribute the most in the development of a region. The following lines are an assessment of these resources in the region

4.2.1.1 Major Physiographic zones:

The Uttaranchal Himalayas are divided into the following distinct non-montane and montane physiographic zones as follows:

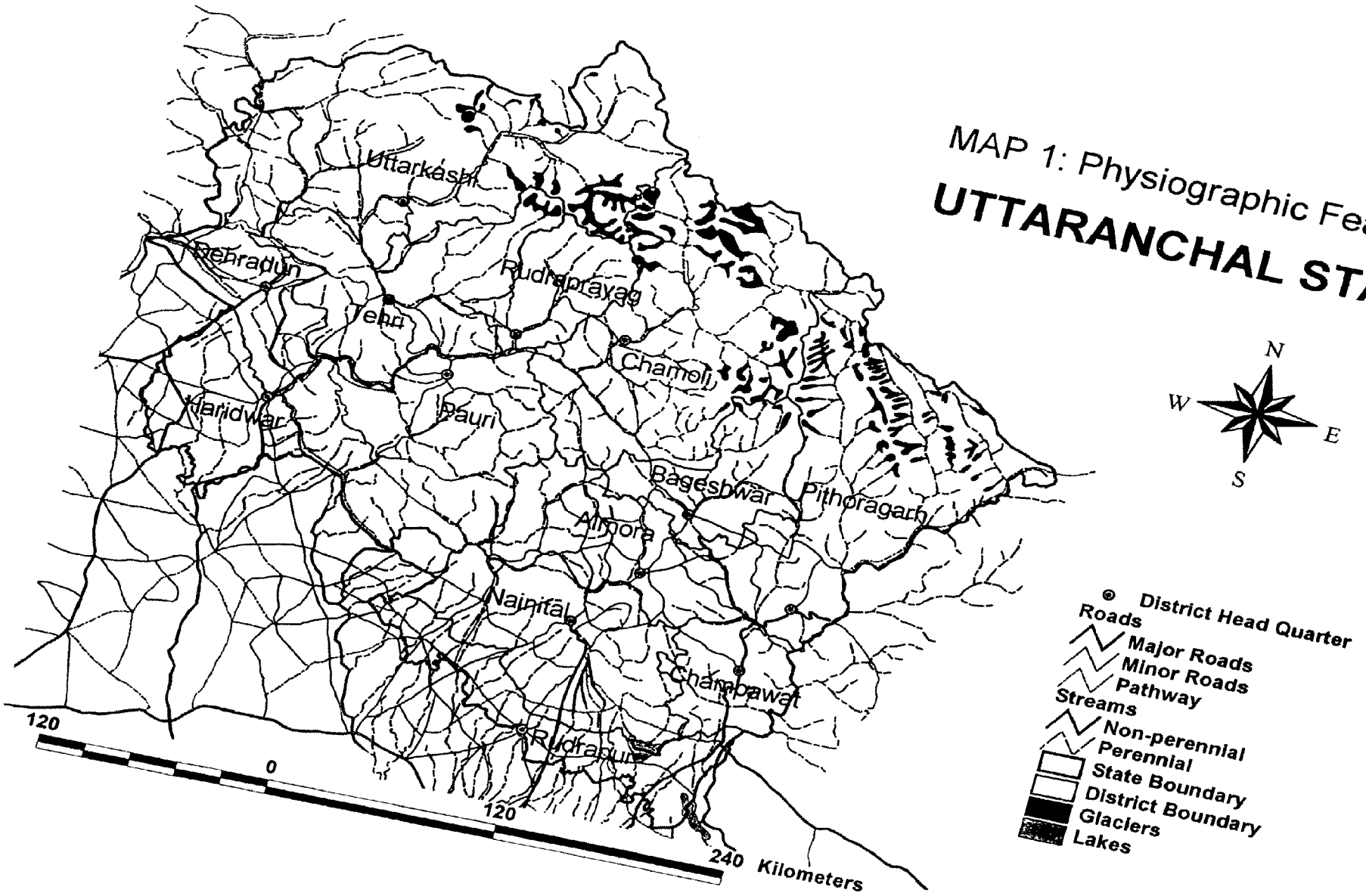
Figure 4.1 Physiographic zones of Himalayas



4.2.1.1.1 *Non-montane:*

i. Tarai: Situated below the Bhabhar and parallel to it, the Tarai is a marshy and damp tract (once 80-90 km wide) containing fertile soils with good water retention capacity.

ii. Bhabhar: This is a level surface zone at the foothills of the Himalayas 34 km wide where the Himalayan torrents rush down from the steep slopes and disappear under boulders and gravels due to the extremely porous soil type of Bhabhar.


MAP 1: Physiographic Features
UTTARANCHAL STATE
Uttarkashi
Dehradun
Rudraprayag
Tehri
Chamoli
Haridwar
Pauri
Bageshwar
Pithoragarh
Almora
Nainital
Champawat
Rudrapur
N
W
E
S
District Head Quarter
Roads
Major Roads
Minor Roads
Pathway
Streams
Non-perennial
Perennial
State Boundary
District Boundary
Glaciers
Lakes
120
0
120
240 Kilometers

4.2.1.1.2 *Montane:*

i. Sub-Himalayas: Called Sub-Himalayas because it possesses the least of Himalayan features. It consists of two zones, the **Shivaliks** - the youngest of the Himalayan ranges and the **Doon** (flat longitudinal structural valleys) to the north of Shivaliks. The Shivaliks extend in a narrow varying width of 6 to 30 km with altitudes of 300 to 1000 m.

ii. Mid Himalayas: This zone extends in a varying width of 60-90 km in an abrupt rise in elevation between 1000 m to 3000 m. It contains two types of physiographic sub-units-

a. The Himanchal ranges and **b.** The Himanchal valleys and lake basins.

iii. Greater Himalayas: This zone has a varying width of 40-60 km. The altitude varies between 3000-7000 m. Except for lower valleys; this zone is perpetually covered with snow hence called Himadri. The region covers glacial landforms above 3000 m.

iv. Trans-Himalayas: Also known as the Tethys Himalayas and Indo-Tibet plateau, the region is in the rain-shadow of the Greater Himalayas and is therefore a cold desert. It slopes down to the Yarlungtsangpo (Brahmaputra) river valley in Tibet.

4.2.1.2 Climate:

A variety of climates from tropical to the polar types prevail in the region mainly due to altitude and physiographic complexity. The principal determinants of weather and climatic conditions in the region include:

- Altitude & its physiographic complexity
- Direction of the ridges and location on windward & leeward sides
- Degree of slope and its aspect
- Intensity of forest cover and
- Proximity to water bodies and glaciers.

On the basis of altitude and accompanying features, the region can be divided into 8 types of broad climatic zones:

- Warm Tropical region: below 600 m
- Cold Tropical- Sub Tropical region: 600- 1200 m
- Warm Temperate region: 1200- 1800 m
- Cool Temperate region: 1880- 2400 m
- The Cold region: 2400- 3000 m

- The Alpine region: 3000- 4000 m
- The Glacial region: 4000- 4800 m
- The perpetually frozen region: above 4800 m

4.2.1.3 Temperature:

The mean monthly temperature varies with the altitude as follows: (in degree Centigrade)

- 300 m: 11.0 (December) to 30.2 (August)
- 1600 m: 9.1 (January) to 22.0 (June and July)
- 1700 m: 6.6 (January) to 22.2 (August)
- 1950 m: 3.5 (January) to 21.4 (May)

Temperature decreases with increasing altitude by a normal lapse rate of 3.3 degrees Centigrade for each 1000 m of altitude. Temperature zones range from very hot in Tarai-Bhabhar to extremely cold zone of the higher Himalayas.

4.2.1.4 Precipitation:

Nearly all forms of precipitation from rain to hail and snow can be more or less observed in the region. The maximum rainfall is received during the rainy season characterized by high cloudiness and torrential rainfall. The monsoon commences after mid-June and continues up to September. Snowfall, caused by winter depressions, occurs between January and March.

Although the total amount of rainfall differs at different locations, its temporal trend is more or less similar throughout the area. The area is influenced by the southwest monsoon. There are three distinct seasons namely Rainy (June - September), Winter (October- February) and Summer (March - May). The seasonal variation in rainfall is well marked. The maximum rainfall occurs during the rainy season with the value ranging from 73.8 to 89 per cent of the total annual rainfall.

Table 4.1: variation in rainfall at different altitudes.

Altitude (meters)	Summer	Rainy	Winter
300	86.3	6.9	6.8
1600	73.8	11.9	14.3
1750	80.5	12.6	6.9
1950	89.0	7.8	3.3

Source: http://www.mountaintechnology.com

The annual rainfall tends to increase with increasing elevation in the first instance depending on the situation of the place to the windward or to the leeward side of the high ridges. The interior ranges receive markedly lower rainfall than the frontal ranges for a given elevation. The maximum rainfall occurs around 1200 m, With further increase in elevation, rainfall tends to decrease and at higher altitude snowfall becomes the substantial contributor to the total precipitation.

The average rainfall in the region varies from 1016 mm in Pauri to 2540 mm in Nainital. The duration of the dry period largely depends on the altitude and varies as follows:

Snowfall occurs at places situated on higher elevations particularly above 2000 m. Some Blocks of the districts of Almora, Chamoli, Pauri, Pithoragarh and Tehri have been declared as drought prone and have been taken up under the DPAP scheme.

4.2.1.5 Importance of Aspect:

Directional aspect plays very important role in the development of vegetation, particularly, in higher altitudes as the southern aspect is exposed to more insolation. The insolation on southern aspect is about 1.5. to 2.4 times higher than that of northern aspect. Although east and west aspects receive an equal amount of insolation, the eastern aspect receives the highest insolation during morning before the air temperature becomes fully warm. Western aspects are comparatively hotter and drier than eastern aspects. The difference in the temperature on the different aspects of the hills is the result of differential insolation. The southern aspect is the warmest and northern aspect is the coolest.

In the Himalayas, the effect of aspect is very pronounced, particularly, on high altitudes. The southern aspect is more prone to frost damage and the soil is usually dry because of higher evaporation from the soil. The southern aspect in the Western Himalayas is therefore almost barren because of various adverse factors, while the northern aspect is covered with good forests.

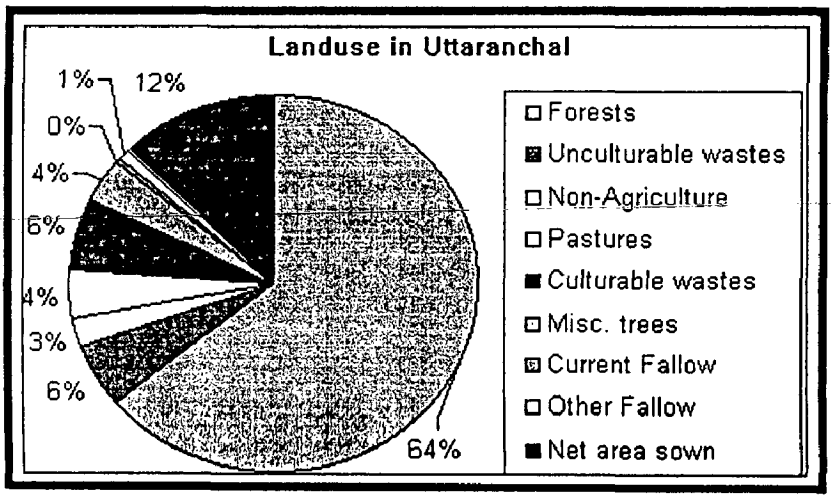
Aspect also plays an important role in receiving rainfall and snowfall. Since most of the rainfall occurs through moisture bearing southwest monsoons, the rainfall is more on the windward side than leeward side. In the Himalayas, the southern aspect receives far more

rainfall than the northern aspect. However, the northern aspect tends to receive more snowfall, which covers the soil for longer periods, particularly at higher altitudes.

4.2.1.6 Land-use:

The figure below presents details of Land-use for Uttaranchal. As we can see, the area under forests is the maximum followed by cultivated area.

Figure: 4.2 Land-use pattern of Uttaranchal State



4.2.1.7 Forests:

The great variations in climate, altitude, rainfall, aspect and soil described above give rise to a rich biodiversity in the Himalayas and support a variety of forest ecosystems. Near the snow line occur the forests of creeping Rhododendron and Birch (Bhojpatra). They are succeeded down by forests of Silver fir (Abies pindrow), Spruce (Picea smithiana), Deodar (Cedrus deodara), Chir pine (Pinus roxburghii) and Oaks (Quercus spp.). On the foothills and in adjoining plains of Bhabhar and Tarai occurs the most valuable Sal (Shorea robusta) forest. Shisham (Dalbergia sissoo), being a pioneer species, is abundant, especially along river courses.

The major forest types based on altitude (Champion and Seth, 1968) consist of four broad vegetation zones, mainly on the basis of climate and altitude with some overlapping of transitional features:

i. Tropical- sub Tropical Forest zone

This zone is dominated by deciduous- sub deciduous types. Sal is the most predominant species found up to an elevation of about 1300 m. The other prominent species are Khair, Semal, Kanju, Sissoo and Haldu etc.

ii. Sub Tropical- Temperate zone

The sub tropical to Temperate pine forests (with 'chir' pine as the dominant coniferous tree) and sub-Tropical to Temperate shrubs dominate at elevations varying between 900 m and 2100 m.

iii. Temperate- sub Alpine zone

This zone of natural vegetation extends generally between 1500 & 3300 m and contains mixed coniferous forests of fir, spruce and birch.

iv. Alpine forests and shrubs

These are found generally up to 4200 m of altitude. With increasing altitude, a gradual transition from larger flora to smaller bushes and Alpine pastures can be observed, beyond which there is a total lack of vegetal cover.

Table 4.2: The distribution of forests under major legal classifications.

State/ District	Total	Percentage distribution of reporting area in major land-use category								
	Reporting area (Ha)	Forests	Non-agricultural use	Barren & uncultivable Land	Permanent pastures grazing	Misc. tree, crops & groves	Cultivable waste land	Current fallow	Other than current fallow	Net sown area
Uttarkashi	817631	88.83	0.85	2.47	1.71	0.94	1.12	0.01	0.48	3.61
Dehradun	307377	68.87	5.57	0.54	0.03	1.40	3.93	0.92	1.55	17.20
Tehri-garhwal	574544	69.13	1.88	2.09	0.49	-	12.46	0.01	1.44	12.50
Chamoli, Rudraprayag	841382	61.93	2.15	19.60	2.59	4.20	3.96	0.01	0.19	5.37
Pauri Garhwal	759650	59.40	2.30	4.50	5.69	8.09	5.83	0.02	2.34	11.82
Almora, Bagheshwer	728701	54.06	2.39	4.42	8.33	6.38	8.26	0.09	1.03	15.00
Pithoragarh, Champawat	637200	51.84	2.46	4.22	13.26	7.18	8.77	0.18	2.05	10.03
Nainital, Udhamsingh nagar	702807	57.41	4.66	0.66	0.17	2.38	4.15	0.47	1.04	29.07
Haridwar	190549	22.85	7.60	1.20	0.04	0.46	1.44	1.62	1.40	63.37
Uttaranchal	5369292	63.98	2.54	5.52	4.25	4.06	5.88	0.15	1.19	12.42

Source: http://www.mountaintechnology.com

Table 4.3: The distribution of actual forest cover in the districts. (in sq. km.)

District	Total Land Area	Forest Cover	Total forest cover		% of total	Scrub
			Dense	Open		
Almora	5385	2076	461	2537	47.11	21
Chamoli	9125	2530	622	3152	34.54	22
Dehradun	3088	1243	327	1570	50.84	90
Garhwal	5440	2207	969	3176	58.38	115
Nainital	6794	2926	642	3568	52.52	5
Pithoragarh	8856	2188	808	2996	33.83	141
Tehri	4421	1811	749	2560	57.91	132
Uttarkashi	8016	2634	465	3099	38.66	41
Total	51125	17615	5043	22658	44.32	567
% of Total Land Area	100	34.45	9.86	44.32		

Source: Uttaranchal: a study 2002.

Thus we can see that of the 63.7 % of the area that is classed as forests, only 77.24 % contains dense forests and 22.26 % contains open forests. Scrub forests represent 2.5 % of the total forest area or 11 % of the Open Forest area. The actual forest cover in the Uttaranchal of dense canopy cover forests is only 34.45 %.

4.2.1.8 Soils:

A variety of factors control soil formation - climate, biotic factors, relief, drainage, parent rock materials and time. The soils in the various regions are as follows :

- Alpine zone (above 3000 m): Soils of glakhial origin with naked rocks and meadows. These soils are mostly granitic sandy loam in nature.
- Cool temperate & sub-tropical zone (900-1800 m): Brown deciduous forest soils and grey coniferous forest soils predominate.
- Warm temperate & sub-tropical zone (900-1800 m): Brown forest soils varying from loam to clayey loam are fairly widespread.
- Tropical zone (<900 m): Alluvial soils mixed with boulders, gravel and pebbles in the Shivalik valleys, Duns and the Bhabhar region.

Soils of the hill districts in general are quite shallow, gravelly, impregnated with unweathered fragments of parent rocks, occurring within a few centimetres at elevated spots to about 2 metres in valleys. The major soil groups found in the region are as under:

a. Red loam soils: The soils of this group occur in association with one another in upper slopes where the soils are freely drained and create a unique moisture regime. The soils, in general, are deep, medium to fine textured, slightly acidic and generally low in fertility.

b. Brown forest soils: This group of soil is found in all districts and have developed from tertiary sedimentaries consisting of sandstone, shale and micaceous grey sand stone at altitude ranging from 600 to 1700 m having an average rainfall of 800-2000 mm. These soils are fairly deep and moderately permeable.

c. Sub-montane soils: The soils of this group are found in all the districts. The soils have developed under unique environment of natural forest vegetation of deodar, spruce, blue pine and chir pine, at high altitudes and high rainfall. The surface layer up to 15 cm is of dark brown to black colour, sandy with loose and undecomposed organic matter and rich in humus at depths ranging from 15 to 50 cm.

d. Mountain meadow soils: This group of soils is generally found at high elevations characterized by dry and cold climate and scanty vegetation, mostly alpine pastures. The soils are shallow to deep and immature. These soils suffer from moisture deficiency resulting from prolonged wind erosion and snow action. Sandy soils of varying depth are found only in the valleys and low-lying terraces. In some plakhes the soils are gravelly sandy loam type.

e. Skeletal soils: The soils of this group are very shallow, representing the weathered mantle of the parent rocks. Owing to deficient precipitation, poor vegetation cover and unfavourable conditions for intensive weathering soil development is limited. Wherever there is any soil cover it is badly affected by wind erosion. The parent rocks are exposed in most of the areas.

The most predominant soil associations in hill areas comprise red loams and brown forest soils. The other types are found only under variations of microtopography. Meadow soils occur only in depressionary pockets in valleys resulting from the accumulation of finer materials and the soil humus removed by rains from the surrounding hill ranges.

Soils associated with higher elevations are highly depleted of fine fractions and contain 42 per cent chert or gravel. On the other hand, the soils associated with lower elevations

(valleys) contain only 21 per cent chert or gravel. Soils associated with pastures and forests (open for grazing) seem to be highly depleted of fine soil formation. The soil depth is mostly shallow to very shallow.

4.2.1.9 Irrigation:

Uttaranchal has an area of 55544 ha under irrigation, which is about 11% of the total net sown area (490028 ha). Gross irrigated area is 1.02 lakh ha which is 12.85 per cent of the gross cropped area.

Table4.4: Source-wise irrigation pattern.

Source of irrigation	% of total irrigated area (ha)
Canal (Gul)	36.13
Tubewells	0.39
Natural streams & other sources	63.48
Total	**100.00**

Source: http:/www.mountaintechnology.com

Table4.5: District-wise irrigation pattern:

District	Net Sown Area	Net Irrigated Area	Irrigated area as % of total area
Almora	63109	7598	12
Chamoli	33350	2563	7.7
Dehradun	50927	18747	36.8
Pauri	83581	7163	8.6
Pithoragarh	58230	5057	8.6
Tehri	67692	9744	14.4
Rudra Prayag	13390	458	3.4
Haridwar	124486	102390	82.2
Bageshwar	36307	3576	9.8
Champawat	20217	1917	9.5
Udhamsingh Nagar	150683	136355	90.5
Nainital	50121	29230	58.3
Uttarkashi	27714	5322	19.2
Total	779807	330120	42.3

Source: http:/www.mountaintechnology.com

The data above show that the main source of irrigation in this region is natural streams covering more than 63% of the total irrigated area followed by Guls (canals). Irrigation is done by conveying the water from Guls to different terraces using the natural gravitational flow of water.

Thus most of the crops in hills are raised under rainfed conditions. Irrigation facilities in the form of pump sets, hydrams, Guls and small tanks are limited up to foot hills and valleys.

4.2.2 SOCIO-ECONOMIC PROFILE OF UTTARANCHAL STATE

4.2.2.1 General:

The total population of Uttarakhand according to 2001 Census is 8479562. About 71 per cent of this population lives in rural areas in 15,117 villages and Agriculture is by far the most important and widespread occupation in the region and 90 per cent of the rural population participates in this activity. The people of the region follow mixed farming with animal husbandry and agriculture being the two interdependent components.

Table 4.6: Demographic profile of Uttaranchal State.

State/District	Area (sq.km)	Population 2001	Sex Ratio 2001	Literacy (Total) 2001	Literacy (Male) 2001	Literacy (Female) 2001	Population Density (Per/sq.km.)
Uttarkashi	8016	294179	941	66.58	84.52	47.48	37
Chamoli	7521	369198	1017	76.23	89.89	63.0	48
Rudraprayag	2539	227461	1117	74.23	90.73	59.98	120
Tehri Garhawal	3796	604608	1051	67.04	85.62	49.76	148
Dehradun	3088	1279083	893	78.96	85.87	71.22	414
Pauri Garhwal	5230	696851	1104	77.99	91.47	66.14	129
Pithauragh	7169	462149	1031	76.48	90.57	63.14	65
Champawat	2004	224461	1024	71.11	88.13	54.75	126
Almora	3689	630446	1147	74.53	90.15	61.43	205
Bageshwar	1696	249453	1110	71.94	88.56	57.45	108
Nainitaal	3422	762912	906	78.60	87.39	70.98	198
Udham S. Nagar	3055	1234548	902	65.76	76.20	54.46	424
Haridwar	2360	1444213	868	64.60	75.06	52.60	612
Uttaranchal	***53483***	***8479562***	***964***	***72.28***	***84.01***	***60.26***	***159***

Source: Uttaranchal general study: an introduction.

The economy of the region is predominantly agrarian. More than 4/5th of the working population is directly engaged in agriculture. Other important occupations include horticulture, forestry, sheep rearing and livestock farming and household or cottage industries. A less developed state of the non- primary sectors result in high dependency on agriculture and uneconomic cultivation of crops together with the environmental limits create not only a condition of deficit but also a "disguised" unemployment.

A variety of small scale and cottage industries receive their developmental potential from resources like forests, minerals, livestock, agriculture and horticulture. A "Money order economy" also prevails in the region due to large-scale migration to the plains for jobs in the Armed Forces, Government or into the Private sector.

4.2.2.2 Land holding pattern:

Land holdings are mostly marginal or sub-marginal in Uttaranchal. According to 1981 census 71 per cent of the operational holdings of hill region are less than 1.0 ha and nearly 86 per cent are upto 2.0 ha.

In addition, these holdings are scattered in various locations and in the form of many fields. A sample survey of the Chamba block (Tehri) revealed the following:

Table 4.7: Land holding pattern; Chamba Block, Tehri Garhwal District

Average number of fields per farm	16 to 42
Average number of locations	4 to 8
Average size of fields	0.038 ha in high hills
	0.034 ha in mid hills
	0.048 ha in valleys

Source: http://www.mountaintechnology.com

4.2.2.3 Migration:

A major trend in the livelihood pattern of people of Uttaranchal is the tremendous amount of permanent migration taking place from the entire hill Blocks. Seasonal migration was reported to be an integral part of the life of the people of Uttaranchal since ancient times. However, after the 1962 Indo-China war, migration of the Shaukas into Tibet has stopped. A decreasing livestock population has also drastically reduced migration for transhumance. Permanent migration is reported to be negligible. Thus the major type of migration is of a semi-permanent nature.

In recent decades, semi-permanent migration in Uttaranchal has increased after the 1962 Indo-China War after which the number of recruitment centres into the army in Uttaranchal were increased. The better accessibility and communication following the war and an increasing tilt towards commercialisation of the economy in Uttaranchal increased to a large extent the migration for employment into the army.

This situation has reached such a state today that it is estimated that out of a total population of 25 lakhs in Kumaon, 1. 27 lakhs persons are employed in the military and paramilitary forces. On an average 1400 people every year join the army, thus 1 out of every 19 households in Kumaon has a person employed in the army. In Pithoragarh this incidence is even higher with 1 out of every 2 households having a person employed in the army and 1 out of every three household having a pensioner. The profile of Garhwal is similar.

A study by S.S. Khanka found that the main reason for migration was insufficient income in 92% of the samples studied. Unemployment (6%) and unstable occupation (1%) were other reasons. It was found that migration occurred mainly due to push factors rather than pull factors. The majority of the migrants are reported to be between 15-35 years of age and largely with formal education. 85% of the sample studied sent money-orders back home, most of which is used for current use. In a large majority of cases the increases in the household income due to migration was found to be more that 5 times.

The study reports that the average labour required per hectare of land cultivated was 1.77 person units. Thus if household labour was in excess to this, the increase in productivity is only marginal.

4.2.2.4 Livestock:

The hill farming system is characterized by large number of livestock. According to the livestock census of 1978, the numbers were as follows:

Table 4.8: Livestock population of Uttaranchal State.

Livestock	Population
Cattle	20.3 lakh
Buffaloes	7.0 lakh
Sheep & goats	40.8 lakh
Total	68.1 lakh

Source: http://www.mountaintechnology.com

Animals are even reared to produce dung for cultivated land. Animal population tends to increase with human population because every land cultivating household attempts to maintain a pair of bullocks for draught purpose, a cow and a buffalo to produce milk and

calves for replacement of bullocks. The landless families also try to rear large number of sheep, goats and buffaloes or cows to get income and to augment family food supplies.

The productivity level of livestock in the hills is low, the main reason being the degraded condition of the grazing land, the storehouse of livestock fodder. The long dry period (14 months) contributes to the poor milk production. This is attributed to unsuccessful insemination and reluctance of farmers to go for it during milking period. The inadequate availability of nutritious fodder and feeds is the other important factor for low milk production.

Livestock subsist mainly on forest floor vegetation. Grazing pressure on an average amounts to 5.67 cattle units per ha, which is 2.83 times higher than the carrying capacity of the grazing lands. Overgrazing of forestland is one of the reasons for their degradation. Bullocks are the only source of power for agriculture in the hills except, of course, human beings. The power developed during ploughing operation by a pair of bullocks is only half of the reported national average.

4.2.2.5 Horticulture:

The very specific agro-climatic conditions of the region offer tremendous potential for the development of horticulture. The varied climatic and soil conditions are ideally suited for growing different sub-tropical and temperate fruits, vegetables and ornamentals.

Table 4.9: Horticulture production in Uttaranchal Stte

Item	Area (00 ha)	Production (00 tons)	Productivity (q/ha)
Apple	490	1650	33.8
Other temperate fruits	320	510	15.9
Nuts and dry fruits	130	80	6.1
Sub-tropical fruits	540	1260	23.3
Vegetables	340	1300	38.3

Source: http://www.mountaintechnology.com

The total area occupied by horticultural crops excluding potato in Uttaranchal during 1985-86 covered 1.82 lakh ha (1 lakh=100,000). Of this area, fruits account for about 71 per cent of the area. Sub-tropical fruits like mango, citrus, litchi, guava, jackfruit, etc. adapted to lower elevations occupy the largest area (0.54 lakh ha) in the zone. The total

production of sub-tropical fruits is about 1.26 lac tons with an average productivity of 23.3 q/ha.

Among temperate fruits, apple is the main crop covering about 0.49 lakh ha area. The total apple production in the Uttaranchal is about 1.65 lakh tons with an average productivity of 3.38 q/ha. Apple can successfully be grown at mid and high elevations (1700- 2500m) that experience cold climate for at least 3-4 months during winter and are not prone to hail-storms and strong winds.

The average productivity of apple is very low as compared to other states of North-West Himalayan region mainly due to critical resource and technological gaps. Other temperate fruits like peach, plum, apricot, pears and cherry are grown on a very limited area (0.32 lakh ha) though there is great potential for their commercial production. The total production of these pome, stone and berry fruits is 0.51 lakh tons with an average productivity of 15.9 q/ha. The area under nuts and dry fruits is confined to only 0.13 lakh ha with an annual production of 0.08 lakh tons and average productivity of 6.1 q/ha.

The major production constraints for non-adoption of these crops on commercial basis are their perishable nature, lack of technical know-how with the growers, poor transportation, storage and communication infrastructure, lack of proper marketing facilities and non-availability of suitable cheap packaging materials.

4.2.3 PHYSICAL AND SOCIAL INFRASTRUCTURE:

For the economic development of any region, a strong network of infrastructural facilities has a significant role. Particularly for hill region, extension and development of infrastructural facilities is very crucial, because of hard nature of geographical structure and difficult climatic conditions. The development of basic infrastructure facilities in the region is the second challenge in front of the government, as these facilities are not properly developed. The development and extension of roads, transport system banks and financial institutions, drinking water, power, educational institutions, vocational training centers, telephones, post offices, medical, and health, information technology, etc are the main items of infrastructural facilities which require priority in the development strategy of the government to boost the economy of the state. (See table 4.10)

Table 4.10: District-wise general information & social, physical infrastructure database:

Distt. Name	Population 2001	Area	Tehsils	C. D. Blocks	Nyaya Panchayat	Gram Sabha	Habitated Villages	Inhabitated Villages
Haridwar	1444213	2360	3	6	46	299	503	124
Nainital	1234548	3055	4	7	44	327	671	13
Udham.S.Nagar	224461	2004	1	4	27	249	651	45
Dehradun	1279083	3088	4	6	40	335	749	18
Uttarkashi	359198	7520	6	9	37	493	1144	89
Rudraprayag	294179	8016	4	6	27	373	677	9
Tehri Garhwal	294179	8016	4	6	76	373	677	9
Chamoli	359198	7520	6	9	39	493	1144	89
Pauri Garhwal	696851	5230	6	15	116	1178	3137	342
Pithoragarh	462149	7159	5	8	64	651	1569	66
Champawat	224461	2004	1	4	24	249	651	45
Almora	249453	1696	2	3	95	344	863	53
Bagheshwar	249453	1696	2	3	35	344	863	53

Source: State Planning Commission, Dehradun (Uttaranchal)

Distt. Name	Forest Villages	Total Villages	Towns 99	Municipal Boards	Municipal Corporations	Cantt Area	Nagar Panchayats
Haridwar	5	627	8	3	0	1	3
Nainital	15	684	15	8	0	1	3
Udham.S.Nagar	9	696	4	1	0	0	6
Dehradun	21	767	17	3	1	4	2
Uttarkashi	13	1233	6	2	0	0	1
Rudraprayag	17	686	3	1	0	0	1
Tehri Garhwal	17	686	3	1	0	0	4
Chamoli	13	1233	6	2	0	0	4
Pauri Garhwal	26	3479	7	4	0	1	1
Pithoragarh	12	1635	3	1	0	0	2
Champawat	9	696	4	1	0	0	2
Almora	4	916	1	1	0	2	1
Bagheshwar	4	916	1	1	0	0	0

Distt. Name	Rural Police Stations	Urban Police Stations	Bus Stations	Railway Stations	Rural Post Offices	Urban Post Offices
Haridwar	3	9	113	14	82	43
Nainital	1	8	220	5	145	22
Udham.S.Nagar	1	8	144	14	84	21
Dehradun	4	11	232	8	182	69
Uttarkashi	3	2	205	0	118	6
Rudraprayag	1	1	132	0	104	3
Tehri Garhwal	0	6	432	0	293	13
Chamoli	0	5	79	0	246	14
Pauri Garhwal	2	7	427	1	409	17
Pithoragarh	6	3	189	0	313	8
Champawat	0	3	53	2	70	5
Almora	4	3	275	0	307	15
Bagheshwar	2	1	83	0	142	2

Distt. Name	Telegraph Offices	Nationalized Banks	Other Banks	Rural Banks	Co operative Banks	Land Development Banks
Haridwar	34	88	2	1	12	3
Nainital	63	53	8	19	20	1
Udham.S.Nagar	49	65	13	8	24	4
Dehradun	13	140	17	14	13	3
Uttarkashi	15	23	0	3	12	1
Rudraprayag	12	16	5	5	5	0
Tehri Garhwal	3	47	0	22	21	1
Chamoli	39	24	0	12	15	1
Pauri Garhwal	10	61	0	36	19	2
Pithoragarh	9	27	1	21	13	1
Champawat	2	19	16	6	6	0
Almora	125	49	8	19	16	2
Bagheshwar	33	13	4	15	4	0

Distt. Name	Ration Shops	Cold Storages	Veterinary Hospitals	Livestock Service Centres	Artificial Breeding Centres	Breeding Centres
Haridwar	132	7	22	27	27	22
Nainital	101	0	20	80	46	7
Udham.S.Nagar	157	5	23	70	70	23
Dehradun	319	0	23	36	36	1
Uttarkashi	13	0	24	31	0	9
Rudraprayag	1	0	12	25	10	0
Tehri Garhwal	41	0	31	65	0	10
Chamoli	40	0	22	46	0	5
Pauri Garhwal	51	0	39	68	5	11
Pithoragarh	50	0	2	51	18	2
Champawat	12	0	2	18	14	2
Almora	42	0	37	62	29	27
Bagheshwar	3	0	10	18	8	4

Distt. Name	Co operative Societies	Registered Industries	Smallscale Indestries	Primary Schools	Middle Schools	Secondary Schools
Haridwar	44	158	5423	930	223	57
Nainital	53	314	5433	1028	261	102
Udham.S.Nagar	33	660	64	815	211	78
Dehradun	41	405	358	1349	425	136
Uttarkashi	46	0	273	608	118	69
Rudraprayag	33	0	371	483	98	70
Tehri Garhwal	94	30	734	1344	344	157
Chamoli	56	0	3954	873	169	98
Pauri Garhwal	134	28	1678	1608	353	249
Pithoragarh	112	0	1801	1196	194	110
Champawat	22	3	112	424	79	42
Almora	81	9	3633	1379	210	163
Bagheshwar	17	18	1651	551	84	58

Distt. Name	Degree Colleges	Universities	I.T.I.	Poly Technics	Allopathic Hospitals	Unani Hospitals	Homeopathic Hospitals
Haridwar	7	2	7	1	27	4	5
Nainital	3	1	6	1	55	0	6
Udham.S.Nagar	4	1	5	2	18	0	2
Dehradun	8	0	6	2	104	1	8
Uttarkashi	4	0	4	1	45	0	4
Rudraprayag	1	0	2	0	28	0	3
Tehri Garhwal	2	0	7	1	35	0	8
Chamoli	4	0	5	1	23	0	5
Pauri Garhwal	4	1	7	3	83	1	7
Pithoragarh	4	0	5	0	47	0	4
Champawat	2	0	3	1	22	0	1
Almora	7	0	8	4	52	0	5
Bagheshwar	1	0	1	0	16	0	2

Distt. Name	Ayurvedic Hospitals	Pri. Health Centres	FamilyWel Centres	Sub Centres	Communicable Diseases Hosp.	Tuberculosis Hospitals
Haridwar	18	26	20	139	7	1
Nainital	24	19	25	134	1	3
Udham.S.Nagar	13	28	7	147	0	0
Dehradun	37	23	4	129	1	2
Uttarkashi	39	12	4	64	1	1
Rudraprayag	18	3	42	25	0	1
Tehri Garhwal	51	25	9	128	0	0
Chamoli	51	14	9	91	0	1
Pauri Garhwal	39	31	15	15	1	0
Pithoragarh	45	21	16	145	2	2
Champawat	11	3	6	50	0	0
Almora	36	32	24	175	0	1
Bagheshwar	8	11	7	70	0	0

Distt. Name	Leprosy Hospitals	Electrified Villages	Non Electrified Villages	Electrified Towns	Water Supplied Villages	NonWater Supplied Villages	Water Supplied Towns
Haridwar	1	431		8	379	44	8
Nainital	1	1008	0	8	1062	0	8
Udham.S.Nagar	0	656	0	15	650	0	15
Dehradun	1	746	0	17	725	0	17
Uttarkashi	1	647	0	3	663	0	3
Rudraprayag	0	533	0	2	654	0	2
Tehri Garhwal	0	1318	0	6	1752	5	6
Chamoli	0	814	0	6	1134	63	6
Pauri Garhwal	1	2189	0	7	2964	149	7
Pithoragarh	1	1181	0	3	1474	4	3
Champawat	0	410	0	4	629	0	4
Almora	1	1720	0	4	2129	15	4
Bagheshwar	0	626	0	1	860	0	1

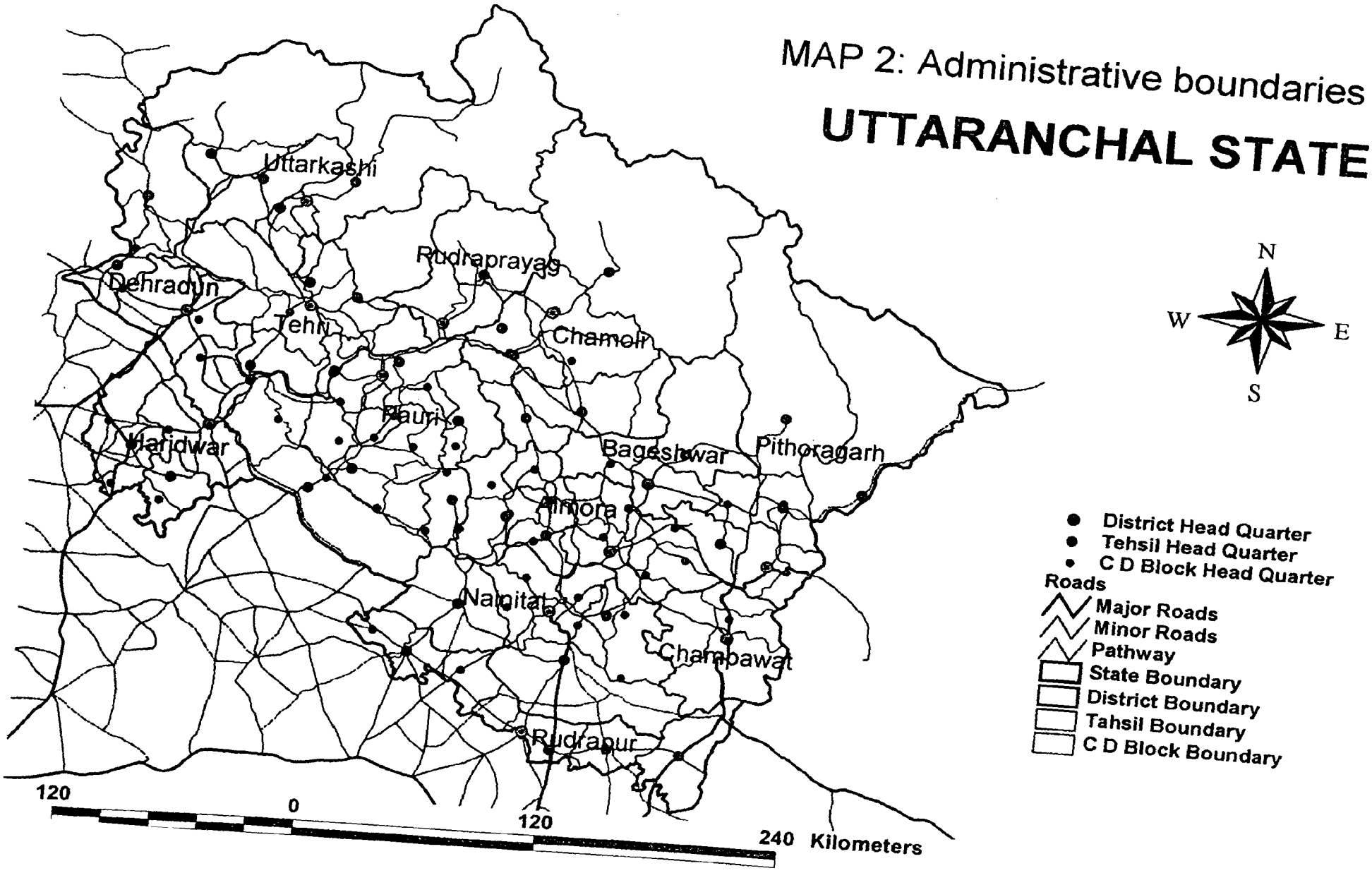
Table 4.12: Administrative division of Uttaranchal State.

S. No.	DISTT NAME	S. No.	TAHSIL NAME	S. No.	C D BLOCK NAME
				1.	Takula
				2.	Hawalbagh
		1.	Almora	3.	Bhaisiya Chana
				4.	Lamgada
				5.	Dhauladevi
1	Almora			6.	Tadikhet
		2.	Ranikhet	7.	Dwarahat
				8.	Chaukhutia
				9.	Bhikiyasain
		3.	Bhikiyasain	10.	sult
				11.	Syalde
		1.	Bageshwar	1.	Bageshwar
2.	Bagheshwar			2.	Garud
		2.	Kapkot	3.	Kapkot
		1.	Chamoli	1.	Ghat
				2.	Dhashauli
				3.	Tharali
		2.	Tharali	4.	Dewal
3.	Chamoli			5.	Narayan Bagar
		3.	Narayan Pokhri	6.	Narayan Pokhri
		4.	Gairsain	7.	Gairsain
		5.	Joshimath	8.	Joshimath
		6.	Karnaprayag	9.	Karnaprayag
				1.	Champawat
				2.	Barakot
4.	Champawat	1.	Champawat	3.	Lohaghat
				4.	Pati
5.	Dehradun			1.	Raipur
		1.	Dehradun	2.	Sahaspur
				3.	Chakrata
		2.	Chakrata	4.	Kalsi

		3.	Vikasnagar	5.	Vikasnagar
		4.	Rhishikesh	6.	Doiwala
				1.	Roorkee
		1.	Roorkee	6.	Bhagwanpur
				3.	Narsan
6.	Haridwar			4.	Laksar
		2.	Laksar	5.	Khanpur
		3.	Haridwar	6.	Bahdarabad
				1.	Kotabagh
		1.	Nainital	2.	Bhimtal
				3.	Ramgarh
7.	Nainital	2.	Dhari	4.	Dhari
				5.	Okhalkanda
		3.	Haldwani	6.	Haldwani
				7.	Ramnagar
		4.	Koshyakutauli	8.	Betalghat
				1.	Pauri
				2.	Khirsu
		1.	Pauri	3.	Pavo
				4.	Kot
				5.	Kaljikhal
				6.	Dwarikhal
				7.	Jahrikhal
8.	Pauri	2.	Launsdowne	8.	Rikhnikhal
				9.	Ekeshwar
				10.	Pokhra
		3.	Kotwdar	11.	Yamkeshwar
				12.	Dungadda
		4.	Thalisain	13.	Thalisain
				14.	Bironkhal
		5.	Dhumakot	15.	Nainidanda
9.	Pithoragarh	1.	Pithoragarh	1.	Pithoragarh
				2.	Munakot

				3.	Didihat
		2.	Didihat	4.	Kanalichhina
				5.	Barinag
		3.	Gangolihat	6.	Gangolihat
		4.	Dharchula	7.	Dharchula
		5.	Munsyari	8.	Munsyari
		1.	Rudraprayag	1.	Agastmuni
10.	Rudraprayag			2.	Jakholi
		2.	Ukhimath	3.	Ukhimath
				1.	Chamba
		1.	Tehri	2.	Jaunpur
				3.	Thauldhar
		2.	Pratapnagar	4.	Pratapnagar
11.	Tehri			5	Jakhnidhar
		3.	Ghansali	6.	Bhilangna
		4.	Devprayag	7.	Devprayag
		5.	Narendranagar	8.	Narendranagar
		6.	Devprayag	9.	Kirtinagar
				1.	Kashipur
		1.	Kashipur	2.	Jaspur
				3.	Bajpur
12.	Udham singh nagar	2.	Kichha	4.	Rudrapur
				5.	Gadarpur
		3.	Sitarganj	6.	Sitarganj
		4.	Khatima	7.	Khatima
		1.	Puraula	1.	Mori
				2.	Puraula
13.	Uttarkashi	2.	Dunda	3.	Dunda
				4.	Chamyali Saun
		3.	Bhatwari	5.	Bhatwari
		4.	Rajgarhi	6.	Naugoan

Source: District Statistical Handbooks 2000, All District of Uttaranchal State.


MAP 2: Administrative boundaries
UTTARANCHAL STATE
N
W
E
S
Uttarkashi
Rudraprayag
Dehradun
Tehri
Chamoli
Pauri
Haridwar
Bageshwar
Pithoragarh
Almora
Nainital
Champawat
Rudrapur
District Head Quarter
Tehsil Head Quarter
C D Block Head Quarter
Roads
Major Roads
Minor Roads
Pathway
State Boundary
District Boundary
Tahsil Boundary
C D Block Boundary
120
0
120
240 Kilometers

4.3 MICRO REGION PROFILE:TEHRI GARHWAL DISTRICT

The entire Uttaranchal State, according to the geography of the region is divided into three distinct physiographic zones, the High mountain region, the Mid-mountain region and the Terai region. But administratively the state comprises of two regions called Kumaon and Garhwal regions. Garhwal region consists of six districts; Uttarkashi, Tehri, Chamoli, Pauri and Dehradun, Champawat, which form the western part of State.

4.3.1 INTRODUCTION:

District Tehri Garhwal, which was earlier a part of Tehri State, became a part of Uttar Pradesh on 1st august 1949. Since 9th November 2000, it became a part of newly formed Uttaranchal State. District extends between latitudes 30p 3'10" N and 300 5'45" and longitudes 780 8'15" E and 790 2'45" E. The area of the district is about 4421 sq. km, and the maximum east-west length by road is about 109 km.

Physiographically, Garhwal differs from Kumaon or Himachal Pradesh, in that it is more rugged with steep sloping mountains. There are less, wide open valleys to be found here than in the other region. Most of the district falls within the Lesser Himalaya zone, though Outer Himalaya and Higher Himalaya also touch it briefly in the southwest and northeast portions respectively.

Himalayan rivers are generally snow-fed and as such perennial. The maximum discharge is during the monsoons (June-September). Tehri Garhwal is drained mainly by the Ganga river system with its western extreme area by the Yamuna river system. The Ganga comprises two sub-systems -- Bhagirathi and Alaknanda. Bhagirathi, along with its main tributary Bhilangna drains the major part of the district. Bhagirathi rises in the Gangotri glaciers in Uttarkashi district, while Bhilangna rises in the Bharatkunth ranges in the northeast part of the district. The two rivers meet at Ganeshprayag (Tehri). Among Bhilangna's tributaries are Balganga and Dharamganga.

From Tehri, Bhagirathi flows to Devprayag where it is met by Alaknanda and there onwards the river is known as the Ganga. Within the district, Alaknanda drains its southeast portions between Rudraprayag and Devprayag. The district's eastern areas are drained by Mandakini which meets Alaknanda at Rudraprayag. Yamuna is in the west of

the district. Barigad and Aglar are its two major tributaries, which rise in the Nagtibba and Surkanda mountains respectively. As is general in most parts of the Himalaya, the climate of the district is too locale-specific, and characterized by the area's elevation, aspect and proximity to factors like snow peaks, glaciers, forests, ridges etc. It ranges from very hot in the valleys to very cold in the high mountains thus providing a whole range of climatic conditions from the tropical to the alpine.

There are three main seasons; summer (or rurhi), monsoon (or chaumasa/bagsi) and winter (or hyund). However, as distinct from the climate in the plains, the summers here are short and less severe, the monsoons have high precipitation and the winters are colder and more prolonged.

The rainfall too varies and the general trend is there is more rain on the ridges than in the valleys. The amount increases with altitude but only up to a point beyond which it begins to decrease again; the maximum being recorded in 1200-1300 m. altitude zone.

4.3.2 HISTORICAL PERSPECTIVE:

The region is rich with legends of a hoary religious past that bring millions of Hindu pilgrims to the scores of places of worship in the District and beyond. The earliest known ruling dynasty in Garhwal was that of the Katyuri kings who ruled here up to the 11th century. At the end of their reign, the region split into 52 garh' or principalities.

The Parmar kings ruled over Garhwai up to 1804 in which year the Gurkha forces took over. However, the Gurkha rule was short- lived. In 1815, with the help of the British, the Gurkhas were ousted; consequently, Garhwal was divided into two. Most areas west of the Alaknanda and Mandakini rivers, was restored to the late King's descendant Sudarshan Shah, which together came to be known as the Tehri Garhwal state. As a result of the split the erstwhile capital Srinagar came under British Garhwal in 1815, the same year Sudrshan Shah located his new capital at Tehri. After Sudarshan Shah, five of his descendants also ruled the Tehri State. In addition to ruling from Tehri, three of the descendants settled new townships at Pratapnagar, Kirtinagar and Narendranagar.

Manvendra Shah was the last ruler of the Tehri Garhwal State, from October 1946 to August 1949 when it merged with the Indian Union to become a part of the U. P. state.

The centres where the rulers lived naturally grew to be the hub of other activities including trade and commerce. Except for Pratapnagar, which is relatively isolated, other towns have maintained some level of activity as they lie in the main spine of the pilgrim routes. The overall development of the region has not been significant since Independence.

The region's border with the Tibetans, the long reign of the Gorkhas, and then of the accession of the adjoining territories by the British, coupled with the more enduring impact of the bearly movements of revival of Hinduism dating back to over 1500 years have all had a cumulative impact on the texture of the population.

4.3.3 DEMOGRAPHY OF THE DISTRICT:

The total population of the District at the last Census (1991) was 604,608, reflecting a 16.15 per cent increase over the last decade. This is against the state average of 19.20 per cent. (See Table 4.11)

Table: 4.13 Decennial Growth in Population 1901-2001

Year	Population	% Growth
1901	199831	--
1911	223569	11.9
1921	236641	05.8
1931	259697	09.8
1941	295321	13.7
1951	306305	03.7
1961	347736	13.5
1971	397385	14.3
1981	497710	25.2
1991	580153	16.6
2001	604608	16.2

Source: District Statistical Handbook 2000, Tehri Garhwal District.

What are very significant among the demographic data are the Male-Female ratio and the Rural-Urban components of the total population. As per 2001 census, the district has 1051 female persons per 1000 male persons as compared to the corresponding national figure of 933 females/ 1000 males. This is indicative of the out migration of the male population to the plains in search of jobs and partly explains the 'money order economy' of the hill districts in general. Similarly, while the urban component of the population at the national level is about 26%, it is only 5.7% in Tehri Garhwal, illustrating the dominance of primary sector economy of the Himalayan region.

Table 4.14: Key Demographic Data of Tehri Garhwal 1991 – 2001

Particulars	1981	1991	2001
Total Population in Lacs	4.89	5.80	6.04
Male percentage of total population	47.89	48.62	48.8
Female percentage of total population	52.11	51.38	51.2
Urban percentage of total population	4.13	5.68	
Rural percentage of total population	95.87	94.32	
Scheduled Cast percentage of total population	12.77	14.30	
Scheduled Tribe percentage of total population	0.00	0.00	
Density of population (persons/ sq.Km.)	113	128	148
Growth rate of population over decade	25.25	16.59	16.15
Literacy percentage	27.91	39.10	67.04
Male Literacy percentage	72.09	85.62	
Female Literacy percentage	26.31	49.76	
Percentage of cultivators and agricultural workers	84.91	80.85	
Percentage of workers in household industry	0.07	0.30	
Percentage of workers of other jobs	15.02	18.85	

Based on: District Statistical Handbook 2000, Tehri Garhwal District.
Report: An action Oriented assessment of market towns in Garhwal Himalayas
Census of India 2001 Uttaranchal

4.3.3.1 Age Profile:

Half the population is under the age of 19. There is a greater uniformity of distribution of age groups in the District as compared to other regions in the plains, resulting in greater pressure on the productive age groups. (see Table 4.12)

Table 4.15: Age Structure of Population 1991

Age Group	Total		Rural		Urban	
	Male	Female	Male	Female	Male	Female
Total	281934	298219	260889	286369	21045	11850
00-06	37800	36270	36390	34760	1410	1510
07-09	40621	40403	38771	38689	1850	1714
10-14	37150	36860	35300	35470	1850	1390
15-19	28950	28676	26700	27745	2250	931
20-24	20575	27561	17364	26211	3211	1350
25-29	18661	22134	15985	20929	2676	1205
30-34	15290	18182	12950	17140	2340	1042
35-39	14120	16934	12430	16130	1690	804
40-44	13061	14764	11871	14270	1190	494
45-49	11047	12170	10155	11870	892	300
50-54	11490	11870	10970	11580	520	290
55-59	8667	7960	8280	7730	387	230
>=60	23072	23765	22423	23215	649	550

Source: District Statistical Handbook 2000. Tehri Garhwal District.

A perceptible number of menfolk in the working age group have migrated outside of the District to other parts of the country, or abroad. The result in the last two decades and more, the womenfolk have had to, per force, take the brunt of the responsibility of taking care of the primary production activities such as livestock breeding, cultivation.

The terrain does not offer the possibilities of establishing large settlements and it is noticed that as much as 1000 villages have population of less than 200. Tehri is by far the largest town. Chamba, New Tehri township, Narendra Nagar and Muni-Ki-Reti have populations between 5000 and 10000.

4.3.4 NATURAL RESOURCES

Nestling as it does in the complex and vulnerable geotectonic Himalayan terrain, the region has not been endowed with mineral resources of any significant value. Only limestone, gypsum and phosphorite are mined in the District.

The large network of waterways offers immense potential for generation of hydel power with micro-hydel technology with least harm to the fragile ecology of the region. Traditional use of mechanical power drawn from the rapid flowing streams is testimony to the potential that such technology can offer.

However, current Plan perspectives on harnessing such potential have centered on poorly conceived large-scale projects. The proposed Tehri Dam alone on the Bhagirathi is expected togenerate up to 2400 mw. These projects not only ride roughshod on the fragile ecological structure of the region causing in the process even longer-term damage to economic potential, but also cause considerable harm to the interests of the inhabitants.

Ironically, the wealth of the District's forests (69% of the total area) has also burdened the district with the responsibility of protecting it from depletion.

Decades of ruthless exploitation of forests, the most important environmental resources of the Himalayan region, for over a century not only rendered the mountains barren and triggered off a chain of adverse environmental impacts, but also had made the otherwise sensitive hill people indifferent towards the enlarging environmental problems.

The region also offers the potential for the growth of high altitude, high value horticultural

and floricultural crops, and aromatic and medicinal plants. The high-altitude alpine pasturelands offer excellent scope for the development of animal husbandry.

4.3.4.1 Tourism:

The lush and abundant forest cover that the District possesses coupled with the splendorous landscape offer considerable aesthetic value that could be exploited as a key resource for promotion of the already burgeoning tourism potential. A conscious effort needs to be made to look at Tourism as a marketable service. There are tremendous prospects for inviting private initiative in the tourism sector.

4.3.5 DISTRICT ECONOMIC PROFILE

Farming is the mainstay of the District economy. However, with cultivable land being as scarce, it has been of subsistence nature.

4.3.5.1 Pattern of land-use:

The broad land use of the district is given in following table.

Table 4.16: Comparative Land-use pattern: Tehri Garhwal

State/ District	Total	Percentage distribution of reporting area in major land-use category								
	Reporting area (Ha)	Forests	Non-agricultural use	Barren & uncultivable	Permanent pastures grazing	Misc.,tree, crops, groves	Cultivable waste land	Current fallow	Other than current fallow	Net sown area
Uttaranchal	**5369292**	**63.98**	**2.54**	**5.52**	**4.25**	**4.06**	**5.88**	**0.15**	**1.19**	**12.42**
Tehri Garhwal	574544	69.13	1.88	2.09	0.49	0.00	12.46	0.01	1.44	12.50

Source: District Statistical Handbook 2000, Tehri Garhwal District.

4.3.5.2 Cultivable Land:

Of the operational holdings, as much as two—thirds ownership is below one hectare. Another quarter of all holdings range between 1 and 2 hectares. Only 10 per cent of all holdings are over 2 hectares. In all there are 88839 land holdings in the district with an overall average of 0.84 Ha per holding. This fragmentation / disaggregation of holdings has posed traditionally a host of solution-defying problems of poor returns for farmers, unfeasibility of investments in improving crop production, etc.

This has further been compounded by the fact that each farm holding -- either big or small, in the higher or lower reaches -- are dispersed over 6 to 7 different geographical locations, with a woefully high split of the farm into little fields ranging from a low of 17 to a high of 40.

This has traditionally been an effective mechanism for management of the high risk of natural hazards that the area is prone to. The scattering of the land has also meant a range of bio-d vegetation, unique to this region.

Critically, however, the extent of disaggregation and dispersal has gone far beyond the optimum range, only to lead to a growing rate of fallowing' of cultivable land. Further, the challenge of providing additional and, in most cases, new irrigation infrastructure has been so formidable that it is impracticable within the paradigms of conventional farm technologies.

Of the total area under agriculture, wheat, rice, pulses and millets occupy more than 60% of the land. The production of wheat is maximum (about 30,000 mt) followed by rice and other millets. Almost the entire cereal and pulse production is used for domestic consumption and the bulk of the horticultural crop and a small share of millet crop is exported.

The District produced about 130,000 tonnes of food grains, 23,000 tonnes of potato and 570 tonnes of oilseeds (1989). The total value of crop production is in the region of Rs. 500 million.

The per capita availability within the District has been above the national average. Yet substantial external farm produce import has been necessitated to cater to the large floating population of tourists.

4.3.5.3 Horticulture:

The production of Horticultural crops in the District totals 33,200 tonnes (1987) generating an estimated trade turnover of Rs. 150 million. This has been confined to certain tiny pockets of the District where there has been entrepreneurial effort. These crops are more a recent development and offer greater potential if harnessed with nurtured enterprise

4.3.5.4 Animal Husbandry:

Characteristic of hill folk, this forms an integral part of their daily existence. The large passenger tourist traffic flowing through the arterial roads of the District has provided a significant means of livelihood for milk farmers in villages in the vicinity. Recently under the Operation Flood programme of the National Diary Development Board, village level committees have been constituted for milk collection and marketing.

4.3.5.5 Off-farm Employment:

This has been largely confined to wage employment on construction, road maintenance etc. Another significant source of employment during May-October has been the provision of services to pilgrims/tourists.

The statistical profile of 'main workers' in Tehri Garhwal provides a better understanding of employment.

Table 4.17: Occupational pattern of employed population in Tehri Garhwal:

Occupational segment	1971		1981		1991	
	No. of workers	Percentage	No. of workers	Percentage	No. of workers	Percentage
Farm	186084		199298		161464	
Farm labour	1127		631		1950	
Animal husbandry/forestry	1394		965		2749	
Mining	57		190		106	
Household industry	2230		1559		549	
Construction	475		8882		9415	
Business	1775		3363		6055	
Transport	422		1841		2451	
Others	9966		13244		21333	
Total	204581		222424		208604	

Source: District Statistical Handbook 2000, Tehri Garhwal District.

4.3.5.6 Industry:

The District has remained undeveloped. GeologiGally and environmentally, the District is not conducive to the establishment of heavy industry. Major entrepreneurship so far is in the. small scale sector, with all of it individually owned.

In 1991-92 there were 107 Small units in the Rhadi sector. Among other small scale industries, 31 units dealt in engineering products, 9 in chemicals, 6 in handlooms, 22 in lhandicrafts and 281 in other fields. These 456 units provided employment to a total of 1396 workers.

Again, the statistics do not signify much since a bulk of these units are confined to Muni ki Reti near Rishikesh in the plains.

4.3.5.7 Income from Various Sources:

Sample studies on this aspect conducted by the G B Pant University of Agriculture suggest that the crop enterprise in the mid- and high hills have been a losing proposition.

Their dependence on non-agricultural income far exceeds the current potential for non-farm employment. This has resulted in men in the working age groups migrating outside the district in search of employment.

Sustained programs need to be initiated to enable farmers in these regions to move away from traditional crop enterprise and to cultivate high-value (low-volume) exportable crops

4.3.5.8 Support Programmes:

The District Rural Development Agency serves as the nodal authority for implementation of the various development programmes. The commercial banks, the Regional Rural Banks and the District Cooperative Banks are the three major players in the provision of financial assistance for the programmes approved by the DRDA. Table 4.16 provides a break-up of sector-wise financial provisions made to sustain the broad bands of activities in the District.

Table 4.18: Sector-wise review of annual credit plan, Lead bank department.

Sector	1999-2000			2000-2001			2001-2002		
	Allo-cation	Achievement No.	%	Allo-cation	Achievement No.	%	Allo-cation	Achievement No.	%
Crop loan	538.71	481.89	89	913.0	569.0	62	1020.89	609.84	59.73
Agriculture activity	610.75	524.48	86	674.0	888.0	132	791.00	704.29	89.03
Small scale industry	289.49	180.63	62	342.0	77.0	23	284.81	302.12	106.07
Trade & services	1424.17	1387.24	97	1748.0	1416.0	81	2031.01	1278.83	62.96
Total	2863.12	2574.24	90	3677.0	2950.0	80	4127.70	2295.08	70.13

Source: Annual credit plan 2002-2003; lead bank, New Tehri.

The problems of poor credit recovery that characterize all rural development program-financing in India are noticed here, too. This is a significant reason for the disbursal of loans under different identified sectors, falling short of the allocations.

4.3.5.9 The Role of Banks:

The major banks in the District have shown excellent Credit:Deposit ratios (1:3 against the national ratio) unlike in rural banks in other parts of the country.

Table 4.19: Deposits and credit situation of commercial banks in Tehri Garhwal (in lacs)

Banks	1999-2000			2000-2001			2001-2002		
	Deposit	Credit	CD Ratio	Deposit	Credit	CD Ratio	Deposit	Credit	CD Ratio
SBI	21498.0	2299.0	10.69	24814.0	2815.70	11.35	27777.00	3170.70	11.41
Union bank	6137.0	842.0	13.72	6803.30	669.98	09.85	6738.00	818.00	12.14
PNB	5252.0	390.0	07.43	7569.00	486.00	06.42	9912.00	613.00	06.18
Kanara bank	719.0	100.0	13.90	900.57	103.10	11.45	1152.05	120.52	10.46
BOI	447.0	143.0	31.99	500.62	194.61	38.87	546.00	251.00	45.97
IOB	622.0	219.0	35.21	934.67	98.25	10.51	1350.00	1062.00	78.66
OBC	262.0	69.0	26.34	760.30	72.76	9.57	1178.00	277.00	23.51
Rural bank	3142.0	850.0	27.05	3546.90	1035.61	29.20	4404.71	1122.72	25.48
Cooperative	9694.0	1653.0	17.05	10951.90	1969.92	17.99	12232.18	2828.80	23.12
TOTAL	**47773.0**	**6565.0**	**13.74**	**56781.60**	**7445.93**	**13.11**	**65289.94**	**10263.69**	**15.72**

Source: Annual credit plan 2002-2003; lead bank, New Tehri.

4.3.6 TRANSPORTATION:

Given the District's dependence on the Plains below for supplies of all goods and services, almost all major roads originate from the railhead in the foothills. Broadly, the roads flow in two directions.

- Vertical or roughly the north-south direction. These are the main roads emanating from the railhead, e.g. Rishikesh Tehri-Uttarkashi (which is the transit route for pilgrims on way to Gangotri and Yamunotri)
- Horizontal or roads roughly in the east-west direction. This network of 'other roads' intersect the main vertical roads at important points, e.g. Suinari, Tehri, Chamba, and on to Mussoorie.

It is along or from these vertical and horizontal roads that the further network of roads has developed in various directions, reaching the other parts of the District. Characteristic of all such mountainous terrain, majority of the roads are found along the major river valleys.

Of the 1773 villages inhabited villages in the District, 256 have roads passing through or touching them, 280 villages are 1 km from the road; as many as 400 villages are up to 3 km away from any road; and 358 villages are up to 5 km away from the road. Nearly a third of the villages are located beyond the 5 km range.

The higher regions in Tehri Garhwal, which are inaccessible by road, are in its northern portion, mainly in the Bhilangana Block. No matter how hard the accessibility to a village, a vast network of bridal paths (which also serve as Trekking Routes for the growing band of intrepid tourists who seek to explore the region on foot) connect every human settlement. About 2000 mules spread across the district serve as the beasts of burden helping in the transport of goods between and amongst the villages.

In the region, there are three types of roads -- State highways, District roads and Block or rural roads (Table 4.18). A major blessing for the District (since it relieves the pressure on financing of construction and maintenance) are the important roads connecting strategic locations in border areas that are maintained by the Directorate General of Border Roads (DGBP). The other roads are taken care of (in the main) by the Public Works Department .

Table 4.20: Network of the roads in district.

CATEGORY	LENGTH	CONCERNED ORGANISATION
State Highway	70 km	PWD
District Roads	66 km	PWD
Block/Rural Roads	929 km	PWD
Bro Road	260 km	DG Border Roads
Town Road	45 km	Municipal/Town Authorities
Other Roads	65 km	Forest/Irrigation
Total	1535 km	

Source: Report: An action Oriented assessment of market towns in Garhwal Himalayas

The massive pilgrim and tourist traffic that passes through the District on way to the holy towns farther north (10 million tourists/pilgrims a year) begins the journey in the foot of the hills at Rishikesh. An average of 100 buses (both public and private sector operators) wind their way up from Rishikesh and the neighboring Hardwar and DehraDun. An equal number of buses trace their way back. There is considerable inter-district movement as well, with these buses touching or halting at 311 bus stops/stations. Besides buses, private, individual or share taxis also operate on the various routes in the region transporting as many a fifth of the total tourist traffic in the year.

Rishikesh also serves as the major collection and distribution point for the goods traffic. Goods are essentially transported on small or large trucks, though buses also carry a marginal share. Almost 50 percent of the goods flow in the District consists of food grains.

In Tehri Garhwal, as far as infrastructure facilities are concerned, it is not one of inadequate number. More significantly, the district suffers from unbalanced distribution and inaccessibility. The real issue is whether it is possible or viable to provide all villages with the basic infrastructure facilities and services.

4.3.7 ADMINISTRATION:

The general flow of Executive functions, as is known, in the Indian administrative set-up devolves in three strands -- one, mainly from the Central Government's allocations toward projects of development in various economic and social sectors; the second fount of such flows is the State Government's independent outlays on Project Plans allocated annually out of its own Budget; the third is the marginal outflow of funds allocated by the State as District Sector Funds with a certain amount of discretionary power vested in the local officials. The devolution of such funds on the first two counts, viz. the Centre and the State Governments, are implemented and monitored by a plethora of sectoral and regional agencies.

4.3.7.1 District Administration:

At the District level itself, the District Magistrate is the highest functionary in the district. The local Administration's tasks may be broadly classed as Revenue, Development and Law & Justice. In these tasks he is assisted by a set of officials at the district level.

The organization at sub district levels is varied. The revenue division range from the Tehsils to Gram Panchayats which have Sub—Divisional Magistrates, Tehsildars, Naik Tehsildars and Patwaris involved in maintaining land records and in collection of revenue, if any. Tehri Garhwal consists of 4 Tehsils, with 85 Nyaya Panchayats and 885 Gram Sabhas. For Development administration the district is sub-divided into 9 development blocks. Each Block has a population of about 50,000 and is supported by a Block Development Officer. This network extends to the Village Development Officers, too. The six Tehsils and the 9 development blocks are:

Table 4.21: Administrative division of Tehri Garhwal District.

District	Tehsil	Blocks
Tehri Garhwal	Tehri	Jaunpur
		Chamba
		Thauldar
	Pratap Nagar	Pratap Nagar
		Jakhnidhar
	Devprayag	Devprayag
		Kirti Nagar
	Ghansali	Bhilangana
	Narendra Nagar	Narendra Nagar

Source: District Statistical Handbook 2000, Tehri Garhwal District.

Besides, there are six towns, of which Tehri and Narendra Nagar have municipalities, while the other four –Devprayag, Muni ki Reti, Chanba and Kirti Nagar come under the notified area (Nagar Panchayat) category. New Tehri Township is recently added in first category.

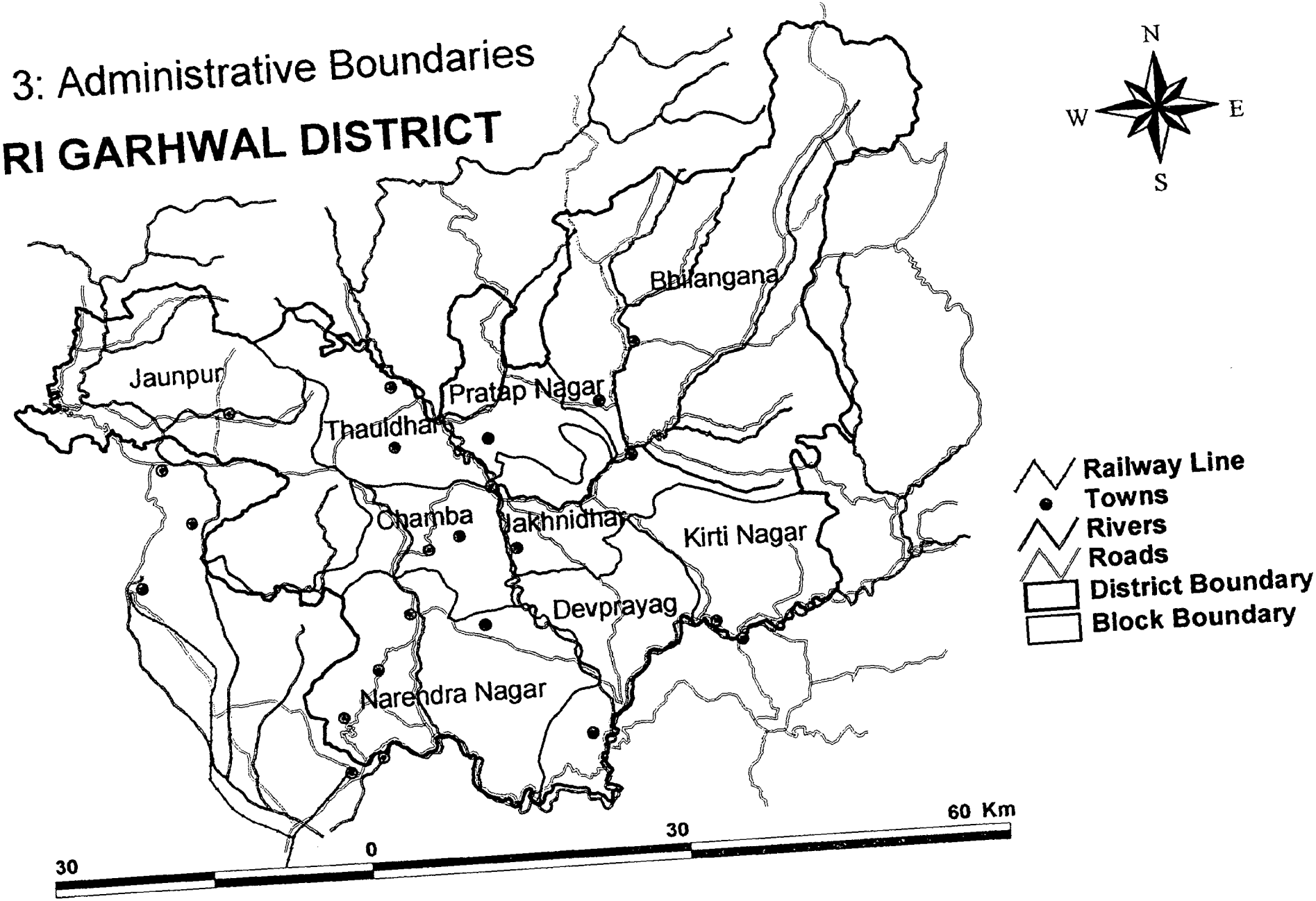
4.3.7.2 Panchayat Raj:

The ZP Headquarters for the District is located in Old Tehri Town and is headed by a Chairman elected by the Block 'Pramukhs' who are in turn elected representatives of the 'Pradhans' of the 885 Gram Sabhas.

The ZP in the Uttaranchal State, unlike in a few other states in India, works in conjunction with the District Administration through the medium of the District Development Board (DDB) which allocates financial resources to the different Blocks in keeping with the overall sectoral allocation patterns designed by the State and Central Governments. The ZP is also the key agency in promoting new initiatives conforming to the aspirations of the people articulated by the Pradhans and other local sub-committees down the line.

MAP 3: Administrative Boundaries

TEHRI GARHWAL DISTRICT



4.3.8 BROADER ISSUES IN THE DEVELOPMENT OF DISTRICT

4.3.8.1 Tehri Dam:

The 260-metre (considered the highest in the world) Dam is by far the largest influencing factor in the economy of the District. The Project envisages expenditure of well over Rs. 300,000 million to be spent over a time span of 15-17 years.

With about a billion rupees spent so far on the Project, the changes wrought on the economy already portend the significant shift in focus of economic activities in the area.

4.3.8.2 Role of Women

Women of Garhwal, particularly the rural women, are in an unenviable position - being burdened with innumerable chores related to home maintenance, cattle keeping and farm operations. The multitude of adverse environmental impacts of deforestation have forced the already overworked women to do the additional drudgery of fetching fodder, fuel and water, sometimes from kilometers away.

An example of gender discrimination against the fair sex is that for 81% of villages, the senior basic schools for girls are located more than 5 km. away whereas for boys. of only 23% of villages have to walk more than 5 km.

At the same time, women are the kingpin of Garhwal's environment and economy. They are more sensitive than menfolk to environmental issues and enterprising in economic activities. The successful functioning of a large number of Mahila Mandals is an example of their zeal to improve their environment, and life.

For the fruition of any developmental programme, it is imperative, to involve women at all stages. But for that, the developmental plans must first be aimed at freeing women from the shackles of drudgery.

4.3.8.3 Role of institutions

Institutions other than the administrative ones play a pivotal role in the developmental process of the hill district. Research and training institutions, NGOs, Mahila Mandal (Women's Forum), and Yuva Kendra (Youth Centre) - all these come under this category. A brief review of select list of institutions in Tehri Garhwal, identified as Agencies of Development, is given below.

There are many other NGOs other than these which are working in the district.

A. **Parvateeya Navjeevan Mandal, Silyara (Ghansali)**
B. **Uttrakhand research institute , Massoorrie road, Chamba**
C. **Mahila navjagran samiti, Chamba**
D. **Human development institute, semandidhar, (Bhilangana)**
E. **Lok jeevan vikas bharti. Bhoodakedar (Bhilangana)**
F. **Women action for development, Ranichouri**
G. **Himalayan development agency, Hulanakhal**
H. **Support for Himalayan handicraft and local production for entrepreneurship, (court canteen, New Tehri)**
I. **Public development institute, chirbatia, (Bhilangana)**
J. **Tree for life, ranichouri**
K. **Indian rural industry institute, muni ki reti.**
L. **Himalayan shiksha prasar samiti, ponibaser.(Bhilangana)**
M. **Sidh samanvit sanstha, Mussoorie.**

A. The hill campus of G.B. Pant University of Agriculture and Technology, Ranichauri.

Located on a area of 202.3 Ha. at Ranichauri 10 Km. south east of Chamba at an altitude varying from 1600 to 2200 mt. It is functioning as a research and education centre of G.B. Pant University of Agriculture and Technology, Pant Nagar. The main objective of the centre is to undertake comprehensive problem-solving and product-oriented research, extension and education programmes for balanced and rapid development of agricultural economy in the State.

B. Shri Bhuvneshwari Mahila Ashram:

This registered Non-Government Organization was established in 1977 by Swami Manmathan in Anjanisain on Tehri Devprayag road, a picturesque village at an altitude of 1750 mt. The main objective of the Ashram is ti improve the condition of women in Garhwal region by activating them, educating them and training them in vocational and other useful skills.

C. Himalaya Parvateeya Jankalyan Samiti

This NGO based in Ranichauri has been involved in variety of environmental and social activities in the area. The HPJKS was among the first to popularize roof-water harvesting structures in the district. The most significant impact of the agency has been in the demonstrating of the vibility of income-generating opportunities and in providing training to the local people on these aspects.

D. Uttarakhand Jan Jagruti Kendra (Uttarakhand public awareness centre)

This ngo is based in khadi jajal and serves as an awareness generation center and hosts many training programmes. The group runs a number of balwarees, has trained people in a number of skills; such as installation of improved chulhas, ferrocement tanks, development of nurseries etc.

E. Society for integrated development for Himalayas

This NGO is based in Mussoorie but is functioning in Jaunpur block of Tehri Garhwal. S.I.D.H has a strong educational support program and is also involved in the promotion of appropriate technologies in the region.

Table: 4.22:

KEY DEMOGRAPHIC AND VILLAGE DATA 1961-2001, TEHRI GARHWAL.

Item	Census year 1961	Census Year 1971	Census year 1981	Census year 1991	Census Year 2001
No. of Household	73382	94662	98300	101262	
Population					
Male	157909	181497	238327	254158	
Female	189827	215888	259383	266056	
Total	347736	397385	497710	520214	
Rural	340140	386862	477164	487319	
Urban	7596	10523	20546	32895	
Schedule Cast	N. A.	52156	63540	72674	
Schedule Tribes	N.A.	435	68	608	
No. of Literates					
Total	55614	76642	138814	204505	
Male	51817	66022	114382	147174	
Female	3797	10620	24432	57331	
No. of Worker					
Total	N.A.	204581	252863	208625	
Male	N.A.	94672	N.A.	110339	
Female	N.A.	109909	N.A.	98286	
No. of Village					
No. of habited Village	1940	1942	1938	1760	
No. of Inhabited Village	76	87	67	54	
Forest Gram	N.A.	16	15	13	
Total	2016	2045	2020	1827	

Source: Internet website; http://www.up.nic.in/tehri

Table 4.23: TEHRI GARHWAL DISTRICT: Key Planning Information

Item	Period	Magnitude
Geographical Area in Sq. Km.	1991	4421.00
No. of Tehsils	1997-98	5
No. of Blocks	1997-98	9
No. of Nyaya Panchayat	1997-98	76
No. of Gram Sabha	1997-98	762
No. of Town and Town Groups	1997-98	6
No. of Municipal Corporation	1997-98	0
No. of Nagar Palika Parishad	1997-98	2
No. of Cantt. Area	1997-98	0
No. of Nagar Panchayat	1997-98	4
No. of Census Town	1991	0
Police Station (in No.)		
Rural	1997-98	0
Urban	1997-98	6
Bus Station/Bus Stop	1997-98	432
Railway Station/Halt	1997-98	0
Length of Railway Line (in Km.)		
Broad Guage	1997-98	0
Narrow Guage	1997-98	0
Post Office (in No.)		
Urban	1997-98	12
Rural	1997-98	293
Telegram Office	1997-98	3
Telephone Connections	1997-98	5736
Commercial Branches (in No.)		
Nationalised Banks	1997-98	45
Others	1997-98	0
Rural Bank Branches	1997-98	23
Co-operative Bank Branches	1997-98	22
Co-operative Agriculture and Village Development Branches	1997-98	1
Fair Price Shops (in No.)		
Rural	1997-98	972
Urban	1997-98	41
Bio-gas Project	1997-98	674
Cold Storage	1997-98	0
Agriculture (in Ha.)		
Net Sown Area	1996-97	67
Net Irrigated Area	1996-97	9
Gross Irrigated Area	1996-97	18

Agriculture Production (in M.Ton/Ha.)		
Food Grains	1996-97	132
Cane	1996-97	0
Tilhan	1996-97	1
Potato	1996-97	33
Climate (in °C)		
General Rainfall	1997-98	1395
Actual Rainfall	1997-98	930
Maximum Temperature	1997-98	31.4
Minimum Temperature	1997-98	- .5
Irrigation		
Length of Canal (in Km.)	1997-98	472
No. of Government Tube-well	1997-98	0
No. of Private Tube-wells and Pump Sets	1997-98	19
Animal Husbandry (in No.)		
Total Animal Husbandry	1993	470325
Vetenary Hospital	1997-98	31
Animal Husbandry Service Centre	1997-98	65
Artificial Breeding Centre	1997-98	10
Artificial Breeding Sub-Centre	1997-98	0
Co-operative (in No.)		
Primary Co-operative Agriculture Loan Societies	1997-98	94
Members of Societies	1997-98	67
Industry (in No.)		
No. of Running Factories Registered under the Industrial Act 1948	1989-90	16
Small Industries	1997-98	758
Workers	1997-98	1530
Education (in No.)		
Primary Schools	1997-98	1344
Junior Schools	1997-98	344
Higher Secondary Schools	1997-98	156
Degree Colleges	1997-98	2
University	1997-98	0
Industrial Training Institute	1997-98	7
Polytechnic	1997-98	1
Public Health		
Hospitals (in No.)		
Allopathic	1997-98	35
Ayurvedic	1997-98	51
Homeopathic	1997-98	8

Unani	1997-98	0
Primary Health Centre	1997-98	25
Family and Mother-Infant Centre	1997-98	9
Family and Mother-Infant Sub-Centre	1997-98	128
Special Hospitals (in No.)		
Tuberculosis	1997-98	0
Leprosy	1997-98	0
Communicable Diseases	1997-98	0
Length of Cemented Road	1996-97	1788
Total Length of Road constructed by PWD	1996-97	1419
Electricity (in No.)		
Total Electrified Village	1997-98	1344
Electrified habitated Village	1997-98	1344
Electrified Town	1997-98	6
The areas availed with water supply after installing taps / Hand pumps		
Village	1997-98	993
City	1997-98	1756
Total No. of lacking villages	1997-98	6
Food Grain Storage (in No.)		
Food corporation of India	1997-98	0
Kendraiya Bhandar Nigam	1997-98	0
Rajya Bhandaragar	1997-98	0
State Government	1997-98	31
Co-operative	1997-98	0
Other	1997-98	0
Food Grain Capacity (in M. Ton)		
Food corporation of India	1997-98	0
Kendraiya Bhandar Nigam	1997-98	0
Rajya Bhandaragar	1997-98	0
State Government	1997-98	7911
Co-operative	1997-98	0
Other	1997-98	0
Entertainment (in No.)		
Cinema Halls	1998-99	1
Total No. of seats in Halls	1998-99	400

Source: Internet website; http://www.up.nic.in/tehri

Table: 4.24:

KEY DEMOGRAPHIC AND VILLAGE DATA 1971-1991, CHAMBA BLOCK

.no.	Item	Census year 1971	Census year 1981	Census year 1991
1.	Population			
	Male	16384	20829	24854
	Female	21294	24491	26834
	Total	37678	45320	51688
	Schedule Cast	3298	Not Available	4643
	Schedule Tribes	0	Not Available	114
	Total (SC & ST)	3298	3788	4757
2.	No. of Literates			
	Total	8591	14020	23742
	Male	7238	11119	15748
	Female	1353	2901	7994
3.	No. of Household			
	No. of Household	8444	9364	10402
4.	No. of Worker			
	Total	14227	21388	19360
5.	No. of Village			
	No. of Inhabited Village	209	213	214
	Total Village	226	226	223

Source: Internet website; http://www.up.nic.in/tehri

Table 4.25: CHAMBA BKOCK: Key Planning Information

S.No.	Item	Ref. Period	Magnitude
1.	Geographical Area	1991	446.00
2.	Nyaya Panchayat	1997-98	8
3.	Gram Sabha	1997-98	74
4.	Panchayat Ghar	1997-98	26
5.	Post Office	1997-98	31
6.	Bus Station/Stop	1997-98	50
7.	Telephone Connections	1997-98	835
8.	Telephone P.C.O.	1997-98	45
9.	Commercial Branches		
	Nationalised Banks	1997-98	3
10.	Rural Bank Branches	1997-98	3
11.	Fair Price Shops	1997-98	121
12.	Bio-gas Project	1997-98	70
13.	Agriculture		
	Net Sown Area	1996-97	5367

	Net Irrigated Area	1996-97	977
	Gross Irrigated Area	1996-97	1446
14.	Irrigation		
	Length of Canal	1997-98	8
	Private Tube-wells	1997-98	0
15.	Animal Husbandry		
	Total Animal Husbandry	1993	25345
	Vetenary Hospital	1997-98	2
	Animal Husbandry Service Centre	1997-98	7
	Artificial Breeding Centre	1997-98	0
	Artificial Breeding Sub-Centre	1997-98	0
16.	Co-operative		
	Primary Co-operative Agriculture Loan Societies	1997-98	8
	Members of Societies	1997-98	7105
17.	Education		
	Primary Schools	1997-98	131
	Junior Schools	1997-98	35
	Higher Secondary Schools	1997-98	15
	Degree Colleges	1997-98	1
	University	1997-98	0
18.	Public Health		
	Hospitals		
	Allopathic	1997-98	3
	Ayurvedic	1997-98	3
	Homeopathic	1997-98	0
	Unani	1997-98	0
	Primary Health Centre	1997-98	1
	Family and Mother-Infant Centre	1997-98	1
	Family and Mother-Infant Sub-Centre	1997-98	14
19.	Length of Cemented Road	1996-97	179
	Total Length of Road constructed by PWD	1996-97	114
20.	Electricity		
	Total Electrified Village	1997-98	173
	Electrified Schedule Cast Localities	1997-98	109
21.	The areas availed with water supply after installing taps/handpumps of Indian Mark-2		
	Village	1997-98	211
	Total No. of lacking villages	1997-98	0

Source: Internet website; http://www.up.nic.in/tehri

Table: 4.26

KEY DEMOGRAPHIC AND VILLAGE DATA 1971-1991, JAUNPUR BLOCK

S.no.	Item	Census year 1971	Census year 1981	Census year 1991
1.	Population			
	Male	17031	22363	25497
	Female	16614	20331	24840
	Total	33645	42694	50337
	Schedule Cast	6609	Not Available	9488
	Schedule Tribes	369	Not Available	311
	Total (SC & ST)	6978	7305	9799
2.	No. of Literates			
	Total	5256	9221	15518
	Male	4892	8431	12510
	Female	364	790	3008
3.	No. of Household			
	No. of Household	6350	7225	8249
4.	No. of Worker			
	Total	21841	25864	23540
5.	No. of Village			
	No. of Inhabited Village	247	251	252
	Total Village	259	259	259

Source: Internet website; http://www.up.nic.in/tehri

Table 4.27: JAUNPUR BKOCK: Key Planning Information

S.No.	Item	Ref. Period	Magnitude
1.	Geographical Area	1991	485.00
2.	Nyaya Panchayat	1997-98	10
3.	Gram Sabha	1997-98	95
4.	Panchayat Ghar	1997-98	25
5.	Post Office	1997-98	26
6.	Bus Station/Stop	1997-98	65
7.	Telephone Connections	1997-98	140
8.	Telephone P.C.O.	1997-98	37
9.	Commercial Branches		
	Nationalised Banks	1997-98	7
10.	Rural Bank Branches	1997-98	3
11.	Fair Price Shops	1997-98	129
12.	Bio-gas Project	1997-98	84
13.	Agriculture		
	Net Sown Area	1996-97	7214

	Net Irrigated Area	1996-97	701
	Gross Irrigated Area	1996-97	1934
14.	Irrigation		
	Length of Canal	1997-98	143
	Private Tube-wells	1997-98	0
15.	Animal Husbandry		
	Total Animal Husbandry	1993	73551
	Vetenary Hospital	1997-98	5
	Animal Husbandry Service Centre	1997-98	9
	Artificial Breeding Centre	1997-98	0
	Artificial Breeding Sub-Centre	1997-98	0
16.	Co-operative		
	Primary Co-operative Agriculture Loan Societies	1997-98	13
	Members of Societies	1997-98	7318
17.	Education		
	Primary Schools	1997-98	167
	Junior Schools	1997-98	43
	Higher Secondary Schools	1997-98	11
	Degree Colleges	1997-98	0
	University	1997-98	0
18.	Public Health		
	Hospitals		
	Allopathic	1997-98	4
	Ayurvedic	1997-98	7
	Homeopathic	1997-98	2
	Unani	1997-98	0
	Primary Health Centre	1997-98	3
	Family and Mother-Infant Centre	1997-98	1
	Family and Mother-Infant Sub-Centre	1997-98	16
19.	Length of Cemented Road	1996-97	325
	Total Length of Road constructed by PWD	1996-97	302
20.	Electricity		
	Total Electrified Village	1997-98	208
	Electrified Schedule Cast Localities	1997-98	193
21.	The areas availed with water supply after installing taps/handpumps of Indian Mark-2		
	Village	1997-98	248
	Total No. of lacking villages	1997-98	4

Source: Internet website; http://www.up.nic.in/tehri

Table: 4.28

KEY DEMOGRAPHIC AND VILLAGE DATA 1971-1991, THAULDHAR BLOCK

S.no.	Item	Census year 1971	Census year 1981	Census year 1991
1.	Population			
	Male	14624	19015	21909
	Female	17251	20650	22364
	Total	31875	39665	44273
	Schedule Cast	4463	Not Available	7284
	Schedule Tribes	0	Not Available	46
	Total (SC & ST)	4463	5708	7330
2.	No. of Literates			
	Total	5644	10773	16993
	Male	4943	8940	12637
	Female	701	1833	4356
3.	No. of Household			
	No. of Household	6480	8075	8738
4.	No. of Worker			
	Total	12809	20276	17329
5.	No. of Village			
	No. of Inhabited Village	173	176	176
	Total Village	182	182	183

Source: Internet website; http://www.up.nic.in/tehri

Table 4.29: JAUNPUR BKOCK: Key Planning Information

S.No.	Item	Ref. Period	Magnitude
1.	Geographical Area	1991	210.00
2.	Nyaya Panchayat	1997-98	6
3.	Gram Sabha	1997-98	70
4.	Panchayat Ghar	1997-98	36
5.	Post Office	1997-98	28
6.	Bus Station/Stop	1997-98	31
7.	Telephone Connections	1997-98	376
8.	Telephone P.C.O.	1997-98	13
9.	Commercial Branches		
	Nationalised Banks	1997-98	1
10.	Rural Bank Branches	1997-98	2
11.	Fair Price Shops	1997-98	124
12.	Bio-gas Project	1997-98	70

13.	Agriculture		
	Net Sown Area	1996-97	6392
	Net Irrigated Area	1996-97	692
	Gross Irrigated Area	1996-97	1743
14.	Irrigation		
	Length of Canal	1997-98	42
	Private Tube-wells	1997-98	0
15.	Animal Husbandry		
	Total Animal Husbandry	1993	29438
	Vetenary Hospital	1997-98	3
	Animal Husbandry Service Centre	1997-98	5
	Artificial Breeding Centre	1997-98	2
	Artificial Breeding Sub-Centre	1997-98	0
16.	Co-operative		
	Primary Co-operative Agriculture Loan Societies	1997-98	7
	Members of Societies	1997-98	4797
17.	Education		
	Primary Schools	1997-98	121
	Junior Schools	1997-98	28
	Higher Secondary Schools	1997-98	16
	Degree Colleges	1997-98	0
	University	1997-98	0
18.	Public Health		
	Hospitals		
	Allopathic	1997-98	1
	Ayurvedic	1997-98	4
	Homeopathic	1997-98	1
	Unani	1997-98	0
	Primary Health Centre	1997-98	3
	Family and Mother-Infant Centre	1997-98	1
	Family and Mother-Infant Sub-Centre	1997-98	11
19.	Length of Cemented Road	1996-97	105
	Total Length of Road constructed by PWD	1996-97	80
20.	Electricity		
	Total Electrified Village	1997-98	152
	Electrified Schedule Cast Localities	1997-98	114
21.	The areas availed with water supply after installing taps/handpumps of Indian Mark-2		
	Village	1997-98	165
	Total No. of lacking villages	1997-98	0

Source: Internet website; http://www.up.nic.in/tehri

Table: 4.30

KEY DEMOGRAPHIC & VILLAGE DATA 1971-1991, PRATAP NAGAR BLOCK

S.no.	Item	Census year 1971	Census year 1981	Census year 1991
1.	Population			
	Male	14802	21374	25458
	Female	21084	24491	27393
	Total	35886	45865	52851
	Schedule Cast	4662	Not Available	6640
	Schedule Tribes	0	Not Available	0
	Total (SC & ST)	4662	5561	6640
2.	No. of Literates			
	Total	5946	11583	18520
	Male	5442	10506	15109
	Female	504	1077	3411
3.	No. of Household			
	No. of Household	7417	8251	9105
4.	No. of Worker			
	Total	20554	22158	19964
5.	No. of Village			
	No. of Inhabited Village	121	121	122
	Total Village	126	126	126

Source: Internet website; http://www.up.nic.in/tehri

Table 4.31: NARENDRA NAGAR BKOCK: Key Planning Information

S.No.	Item	Ref. Period	Magnitude
1.	Geographical Area	1991	231.00
2.	Nyaya Panchayat	1997-98	8
3.	Gram Sabha	1997-98	83
4.	Panchayat Ghar	1997-98	22
5.	Post Office	1997-98	23
6.	Bus Station/Stop	1997-98	41
7.	Telephone Connections	1997-98	38
8.	Telephone P.C.O.	1997-98	17
9.	Commercial Branches		
	Nationalised Banks	1997-98	3
10.	Rural Bank Branches	1997-98	2
11.	Fair Price Shops	1997-98	100
12.	Bio-gas Project	1997-98	69
13.	Agriculture		
	Net Sown Area	1996-97	5052

Table: 4.32

KEY DEMOGRAPHIC AND VILLAGE DATA 1971-1991, JAKHNIDHAR BLOCK

S.no.	Item	Census year 1971	Census year 1981	Census year 1991
1.	Population			
	Male	15720	19034	21233
	Female	19500	22768	24846
	Total	35220	41802	46079
	Schedule Cast	4491	Not Available	6397
	Schedule Tribes	0	Not Available	3
	Total (SC & ST)	4491	4908	6400
2.	No. of Literates			
	Total	5509	9291	16636
	Male	5007	7843	11627
	Female	502	1448	5009
3.	No. of Household			
	No. of Household	6882	8137	8913
4.	No. of Worker			
	Total	20047	21820	19187
5.	No. of Village			
	No. of Inhabited Village	145	148	148
	Total Village	154	153	151

Source: Internet website; http://www.up.nic.in/tehri

Table 4.33: JAKHNIDHAR BKOCK: Key Planning Information

S.No.	Item	Ref. Period	Magnitude
1.	Geographical Area	1991	240.00
2.	Nyaya Panchayat	1997-98	7
3.	Gram Sabha	1997-98	76
4.	Panchayat Ghar	1997-98	17
5.	Post Office	1997-98	39
6.	Bus Station/Stop	1997-98	35
7.	Telephone Connections	1997-98	296
8.	Telephone P.C.O.	1997-98	43
9.	Commercial Branches		
	Nationalised Banks	1997-98	5
10.	Rural Bank Branches	1997-98	0
11.	Fair Price Shops	1997-98	34
12.	Bio-gas Project	1997-98	87
13.	Agriculture		
	Net Sown Area	1996-97	5730

	Net Irrigated Area	1996-97	929
	Gross Irrigated Area	1996-97	1552
14.	Irrigation		
	Length of Canal	1997-98	6
	Private Tube-wells	1997-98	0
15.	Animal Husbandry		
	Total Animal Husbandry	1993	31752
	Vetenary Hospital	1997-98	3
	Animal Husbandry Service Centre	1997-98	5
	Artificial Breeding Centre	1997-98	0
	Artificial Breeding Sub-Centre	1997-98	0
16.	Co-operative		
	Primary Co-operative Agriculture Loan Societies	1997-98	9
	Members of Societies	1997-98	7955
17.	Education		
	Primary Schools	1997-98	125
	Junior Schools	1997-98	32
	Higher Secondary Schools	1997-98	12
	Degree Colleges	1997-98	0
	University	1997-98	0
18.	Public Health		
	Hospitals		
	Allopathic	1997-98	3
	Ayurvedic	1997-98	4
	Homeopathic	1997-98	0
	Unani	1997-98	0
	Primary Health Centre	1997-98	3
	Family and Mother-Infant Centre	1997-98	1
	Family and Mother-Infant Sub-Centre	1997-98	12
19.	Length of Cemented Road	1996-97	113
	Total Length of Road constructed by PWD	1996-97	102
20.	Electricity		
	Total Electrified Village	1997-98	118
	Electrified Schedule Cast Localities	1997-98	77
21.	The areas availed with water supply after installing taps/handpumps of Indian Mark-2		
	Village	1997-98	148
	Total No. of lacking villages	1997-98	0

Source: Internet website; http://www.up.nic.in/tehri

Table: 4.34

KEY DEMOGRAPHIC AND VILLAGE DATA 1971-1991, DEVPRAYAG BLOCK

S.no.	Item	Census year 1971	Census year 1981	Census year 1991
1.	Population			
	Male	16930	20718	22883
	Female	20837	24621	26455
	Total	37767	45339	49338
	Schedule Cast	4563	Not Available	6871
	Schedule Tribes	0	Not Available	54
	Total (SC & ST)	4563	5677	6925
2.	No. of Literates			
	Total	6725	11142	18912
	Male	5812	9042	12876
	Female	913	2100	6036
3.	No. of Household			
	No. of Household	8569	9315	10490
4.	No. of Worker			
	Total	14979	22298	20012
5.	No. of Village			
	No. of Inhabited Village	245	244	245
	Total Village	260	256	256

Source: Internet website; http://www.up.nic.in/tchri

Table 4.35: DEVPRAYAG BKOCK: Key Planning Information

S.No.	Item	Ref. Period	Magnitude
1.	Geographical Area	1991	420.00
2.	Nyaya Panchayat	1997-98	10
3.	Gram Sabha	1997-98	89
4.	Panchayat Ghar	1997-98	35
5.	Post Office	1997-98	32
6.	Bus Station/Stop	1997-98	49
7.	Telephone Connections	1997-98	491
8.	Telephone P.C.O.	1997-98	74
9.	Commercial Branches		
	Nationalised Banks	1997-98	3
10.	Rural Bank Branches	1997-98	1
11.	Fair Price Shops	1997-98	100
12.	Bio-gas Project	1997-98	51
13.	Agriculture		
	Net Sown Area	1996-97	9109

	Net Irrigated Area	1996-97	1092
	Gross Irrigated Area	1996-97	2439
14.	Irrigation		
	Length of Canal	1997-98	7
	Private Tube-wells	1997-98	0
15.	Animal Husbandry		
	Total Animal Husbandry	1993	42535
	Vetenary Hospital	1997-98	3
	Animal Husbandry Service Centre	1997-98	8
	Artificial Breeding Centre	1997-98	0
	Artificial Breeding Sub-Centre	1997-98	0
16.	Co-operative		
	Primary Co-operative Agriculture Loan Societies	1997-98	10
	Members of Societies	1997-98	8601
17.	Education		
	Primary Schools	1997-98	137
	Junior Schools	1997-98	36
	Higher Secondary Schools	1997-98	16
	Degree Colleges	1997-98	0
	University	1997-98	0
18.	Public Health		
	Hospitals		
	Allopathic	1997-98	3
	Ayurvedic	1997-98	4
	Homeopathic	1997-98	0
	Unani	1997-98	0
	Primary Health Centre	1997-98	2
	Family and Mother-Infant Centre	1997-98	1
	Family and Mother-Infant Sub-Centre	1997-98	11
19.	Length of Cemented Road	1996-97	139
	Total Length of Road constructed by PWD	1996-97	76
20.	Electricity		
	Total Electrified Village	1997-98	139
	Electrified Schedule Cast Localities	1997-98	104
21.	The areas availed with water supply after installing taps / handpumps of Indian Mark-2		
	Village	1997-98	245
	Total No. of lacking villages	1997-98	0

Source: Internet website; http://www.up.nic.in/tehri

Table: 4.36

KEY DEMOGRAPHIC AND VILLAGE DATA 1971-1991, KIRTIGANAR BLOCK

S.no.	Item	Census year 1971	Census year 1981	Census year 1991
1.	Population			
	Male	16569	20686	18867
	Female	21705	24764	21555
	Total	38274	45450	40422
	Schedule Cast	4355	Not Available	6175
	Schedule Tribes	45	Not Available	1
	Total (SC & ST)	4400	5825	6176
2.	No. of Literates			
	Total	8808	14657	18766
	Male	6684	10860	11745
	Female	2124	3797	7021
3.	No. of Household			
	No. of Household	13019	9097	8138
4.	No. of Worker			
	Total	19685	21690	15374
5.	No. of Village			
	No. of Inhabited Village	202	184	153
	Total Village	204	186	154

Source: Internet website; http://www.up.nic.in/tehri

Table 4.37: KIRTI NAGAR BKOCK: Key Planning Information

S.No.	Item	Ref. Period	Magnitude
1.	Geographical Area	1991	179.00
2.	Nyaya Panchayat	1997-98	8
3.	Gram Sabha	1997-98	67
4.	Panchayat Ghar	1997-98	35
5.	Post Office	1997-98	25
6.	Bus Station/Stop	1997-98	48
7.	Telephone Connections	1997-98	303
8.	Telephone P.C.O.	1997-98	55
9.	Commercial Branches		
	Nationalised Banks	1997-98	3
10.	Rural Bank Branches	1997-98	3
11.	Fair Price Shops	1997-98	91
12.	Bio-gas Project	1997-98	52
13.	Agriculture		
	Net Sown Area	1996-97	8037

	Net Irrigated Area	1996-97	990
	Gross Irrigated Area	1996-97	2151
14.	Irrigation		
	Length of Canal	1997-98	45
	Private Tube-wells	1997-98	0
15.	Animal Husbandry		
	Total Animal Husbandry	1993	33133
	Vetenary Hospital	1997-98	1
	Animal Husbandry Service Centre	1997-98	9
	Artificial Breeding Centre	1997-98	1
	Artificial Breeding Sub-Centre	1997-98	0
16.	Co-operative		
	Primary Co-operative Agriculture Loan Societies	1997-98	8
	Members of Societies	1997-98	4701
17.	Education		
	Primary Schools	1997-98	123
	Junior Schools	1997-98	26
	Higher Secondary Schools	1997-98	20
	Degree Colleges	1997-98	0
	University	1997-98	0
18.	Hospitals		
	Allopathic	1997-98	3
	Ayurvedic	1997-98	5
	Homeopathic	1997-98	0
	Unani	1997-98	0
	Primary Health Centre	1997-98	1
	Family and Mother-Infant Centre	1997-98	0
	Family and Mother-Infant Sub-Centre	1997-98	10
19.	Length of Cemented Road	1996-97	153
	Total Length of Road constructed by PWD	1996-97	148
20.	Electricity		
	Total Electrified Village	1997-98	113
	Electrified Schedule Cast Localities	1997-98	66
21.	The areas availed with water supply after installing taps/handpumps of Indian Mark-2		
	Village	1997-98	153
	Total No. of lacking villages	1997-98	0

Source: Internet website; http://www.up.nic.in/tehri

Table: 4.38

KEY DEMOGRAPHIC & VILLAGE DATA 1971-1991, BHILANGANA BLOCK

S.no.	Item	Census year 1971	Census year 1981	Census year 1991
1.	Population			
	Male	19799	24192	42157
	Female	22863	26993	48631
	Total	42662	51185	90788
	Schedule Cast	6450	Not Avaliable	15704
	Schedule Tribes	0	Not Avaliable	10
	Total (SC & ST)	6450	7604	15714
2.	No. of Literates			
	Total	6711	12179	29523
	Male	6228	10684	21888
	Female	483	1495	7635
3.	No. of Household			
	No. of Household	8266	9700	16744
4.	No. of Worker			
	Total	25396	29956	38045
5.	No. of Village			
	No. of Inhabited Village	182	181	260
	Total Village	192	192	268

Source: Internet website; http://www.up.nic.in/tehri

Table 4.39: BHILANGANA BKOCK: Key Planning Information

S.No.	Item	Ref. Period	Magnitude
1.	Geographical Area	1991	1250.00
2.	Nyaya Panchayat	1997-98	11
3.	Gram Sabha	1997-98	127
4.	Panchayat Ghar	1997-98	36
5.	Post Office	1997-98	53
6.	Bus Station/Stop	1997-98	66
7.	Telephone Connections	1997-98	261
8.	Telephone P.C.O.	1997-98	20
9.	Commercial Branches		
	Nationalised Banks	1997-98	5
10.	Rural Bank Branches	1997-98	6
11.	Fair Price Shops	1997-98	200
12.	Bio-gas Project	1997-98	98
13.	Agriculture		
	Net Sown Area	1996-97	5632

	Net Irrigated Area	1996-97	974
	Gross Irrigated Area	1996-97	1621
14.	Irrigation		
	Length of Canal	1997-98	192
	Private Tube-wells	1997-98	0
15.	Animal Husbandry		
	Total Animal Husbandry	1993	61029
	Vetenary Hospital	1997-98	4
	Animal Husbandry Service Centre	1997-98	7
	Artificial Breeding Centre	1997-98	1
	Artificial Breeding Sub-Centre	1997-98	0
16.	Co-operative		
	Primary Co-operative Agriculture Loan Societies	1997-98	14
	Members of Societies	1997-98	13286
17.	Education		
	Primary Schools	1997-98	217
	Junior Schools	1997-98	60
	Higher Secondary Schools	1997-98	25
	Degree Colleges	1997-98	0
	University	1997-98	0
18.	Public Health		
	Hospitals		
	Allopathic	1997-98	7
	Ayurvedic	1997-98	9
	Homeopathic	1997-98	1
	Unani	1997-98	0
	Primary Health Centre	1997-98	4
	Family and Mother-Infant Centre	1997-98	1
	Family and Mother-Infant Sub-Centre	1997-98	25
19.	Length of Cemented Road	1996-97	161
	Total Length of Road constructed by PWD	1996-97	157
20.	Electricity		
	Total Electrified Village	1997-98	175
	Electrified Schedule Cast Localities	1997-98	132
21.	The areas availed with water supply after installing taps / handpumps of Indian Mark-2		
	Village	1997-98	259
	Total No. of lacking villages	1997-98	0

Table: 4.40 KEY DEMOGRAPHIC AND VILLAGE DATA 1971-1991, NARENDRA NAGAR BLOCK

S.no.	Item	Census year 1971	Census year 1981	Census year 1991
1.	Population			
	Male	16506	23050	29664
	Female	19796	24864	30921
	Total	36302	47914	60585
	Schedule Cast	3869	Not Available	6007
	Schedule Tribes	0	Not Available	1
	Total (SC & ST)	3869	4397	6008
2.	No. of Literates			
	Total	6221	12226	23194
	Male	5551	10440	16826
	Female	670	1786	6368
3.	No. of Household			
	No. of Household	9553	9262	11840
4.	No. of Worker			
	Total	18035	23288	22344
5.	No. of Village			
	No. of Inhabited Village	209	209	208
	Total Village	216	213	213

Source: Internet website; http://www.up.nic.in/tehri

Table 4.41: NARENDRA NAGAR BKOCK: Key Planning Information

S.No.	Item	Ref. Period	Magnitude
1.	Geographical Area	1991	245.00
2.	Nyaya Panchayat	1997-98	8
3.	Gram Sabha	1997-98	81
4.	Panchayat Ghar	1997-98	30
5.	Post Office	1997-98	36
6.	Bus Station/Stop	1997-98	41
7.	Telephone Connections	1997-98	210
8.	Telephone P.C.O.	1997-98	22
9.	Commercial Branches		
	Nationalised Banks	1997-98	3
10.	Rural Bank Branches	1997-98	2
11.	Fair Price Shops	1997-98	73
12.	Bio-gas Project	1997-98	93
13.	Agriculture		
	Net Sown Area	1996-97	7283

	Net Irrigated Area	1996-97	701
	Gross Irrigated Area	1996-97	1934
14.	Irrigation		
	Length of Canal	1997-98	14
	Private Tube-wells	1997-98	0
15.	Animal Husbandry		
	Total Animal Husbandry	1993	51691
	Vetenary Hospital	1997-98	2
	Animal Husbandry Service Centre	1997-98	9
	Artificial Breeding Centre	1997-98	1
	Artificial Breeding Sub-Centre	1997-98	0
16.	Co-operative		
	Primary Co-operative Agriculture Loan Societies	1997-98	12
	Members of Societies	1997-98	7365
17.	Education		
	Primary Schools	1997-98	144
	Junior Schools	1997-98	39
	Higher Secondary Schools	1997-98	14
	Degree Colleges	1997-98	0
	University	1997-98	0
18.	Public Health		
	Hospitals		
	Allopathic	1997-98	2
	Ayurvedic	1997-98	10
	Homeopathic	1997-98	1
	Unani	1997-98	0
	Primary Health Centre	1997-98	3
	Family and Mother-Infant Centre	1997-98	1
	Family and Mother-Infant Sub-Centre	1997-98	12
19.	Length of Cemented Road	1996-97	209
	Total Length of Road constructed by PWD	1996-97	113
20.	Electricity		
	Total Electrified Village	1997-98	153
	Electrified Schedule Cast Localities	1997-98	95
21.	The areas availed with water supply after installing taps/handpumps of Indian Mark-2		
	Village	1997-98	208
	Total No. of lacking villages	1997-98	0

Source: Internet website; http://www.up.nic.in/tehri

5.1. NARENDRA NAGAR BLOCK

Narendra Nagar block of the district is selected for the detailed study. The selection is based on the basis of availability of data and the proximity of the area with the institution for ease of communication.

5.1.1. Area and location:

Total geographical area of the district is 68,123 Ha. It is located at the southern end of the district and is at very close proximity to Rishikesh, the important religious center of the country.

5.1.2. Physiography:

The block is a part of the lesser Himalayas and has steep sloping mountains, making the block vulnerable to landslide hazard. The river Bhagirathi flows from the eastern side of the block, while on the southern side is river Ganga.

5.1.3. Land use

A major percentage almost 65% of total reported area of Narendra Nagar block is occupied by forest cover. The other land-uses of the block is given in table 5.1.

Table 5.1: Land-use pattern of Narendra Nagar Block

PARTICULARS	AREA (HA.)	PERCENTAGE
Forest area	44,421	65.20
Agricultural area	7,457	10.94
Irrigated area	1,232	-
Non-irrigated area	6,225	-
Tea gardens	2,302	3.38
Non-agricultural area	977	1.43
Other uses	1,114	1.63
Barren land	12,160	17.85

Source: Data collected from the Block Head Quarter, Fakot.

5.1.4. Administrative setup

The block administration is under the block development officer, operating from Fakot, the block headquarter. The block is divided into 8 Nyaya Panchayats, which looks after 103 Gram Sabhas consisting of total 208 populated villages. The average distance between

two adjacent gram Sabhas is roughly 5 kms. And the average distance between a village and its gram Sabha is around 2.5 km. the administrative division at various levels is given in table 5.2. **[See Appendix II & III]**

Table 5.2: Administrative division of Narendra Nagar Block

Block	Nyaya Panchayat	No. of Gram Sabhas	No. of Villages	Population
NARENDRA NAGAR	BHAITAN	11	30	5,324
	BANALI	14	30	5,855
	TIMLI	09	26	7,436
	WAIRAIGAON	12	15	6,097
	BUGALA	08	15	5,598
	RANAKOT	17	38	8,264
	MANGAON	15	31	8,378
	AAMPATA	17	33	7,517
TOTAL	08	103	213	54,469

Source: Data collected from the Block Head Quarter, Fakot.

Some major important towns, which also serve as market towns of the block, and their populations, are given below:

Table 5.3: Market towns' population of Narendra Nagar Block

TOWN	POPULATION
Narendra Nagar	5,490
Fakot	500
Agrakhal	750
Muni-ki-reti	8,000
Gaja	650
Shivpuri	600
Gular	800

Source: Data collected from the Block Head Quarter, Fakot.

5.1.5. Settlement size:

The size distribution of 208 villages in the block in different categories is given in table.

Table 5.4: Distribution of villages of block in population categories

POPULATION CATEGORIES	NO. OF VILLAGES	PERCENTAGE
<99	41	19.71
100 to 199	59	28.38
200 to 499	83	39.90
500 to 1000	20	9.51
>1000	5	2.40
TOTAL	208	100

Source: Data collected from the Block Head Quarter, Fakot.

Hence it is seen that majority of settlements i.e. almost fifty percent settlements have populations less than 200. And very few i.e. merely 2.4 percent settlements have population more than 1000.

5.1.6. Demographic profile:

The total population of the block is given below:

Table 5.5: Demographic profile of Narendra Nagar Block

YEAR	MALE	FEMALE	TOTAL
1981 CENSUS	23,050	24,864	47,914
1991 CENSUS	29,664	30,921	60,585

Source: data collected from the block headquarter, Fakot

Information about the percentage of key demographic factors in various Nyaya Panchayat areas is given in the table.

Table 5.6: Demographic data of Narendra Nagar block

DEMOGRAPHIC FACTORS	POPULATION	PERCENTAGE
Males	29664	48.96
Females	30921	51.04
Children	11064	20.31
EWS population	7782	14.28
Illiterates	32093	58.91
Unemployed	28680	52.65
SC & ST % Pop	5989	10.9

Source: data collected from the block headquarter, Fakot

5.1.7. Level of available facilities:

Level of availability of various facilities in the block is given here:

I) Proximity to metalled roads:

The block having hilly terrain has many villages located far away from the vehicular roads. These villages may sometimes require long treks of 12-15 km. Proximity of number of villages to the vehicular roads in the block is given in table

Table 5.7: distance of villages from vehicular roads in Narendra Nagar block

DISTANCE FROM VEHICULAR ROAD	NUMBER OF VILLAGES
0.0-2.0 km	120
2.0-7.0 km	60
>7.0 km	28
Total	**208**

Source: data collected from the block headquarter, Fakot

II) Educational facility:

The availability of educational facilities at various levels in the block is given in table

Table 5.8: Educational facility in Narendra Nagar block.

EDUCATIONAL FACILITY	NUMBER
Primary school	135
Junior high school	38
High school	12
Inter college	10
Polytechnic college	1
TOTAL	**195**

Source: data collected from the block headquarter, Fakot.

III) Electric supply in the block:

Out of total 208 villages of the block, 69 villages i.e. 33% villages have electric supply, while 139 villages, which form 67% of total villages, do not have any electricity.

IV) Health facility:

Health facilities available in the Narendra Nagar block are given in table

Table 5.9: Health facility in Narendra Nagar block.

Facility	Number
Primary health care center	7
Ayurvedic hospitals	11
Homeopathic hospitals	2
Family welfare centers	15
Veterinary hospitals	4
Pashu seva kendra	6

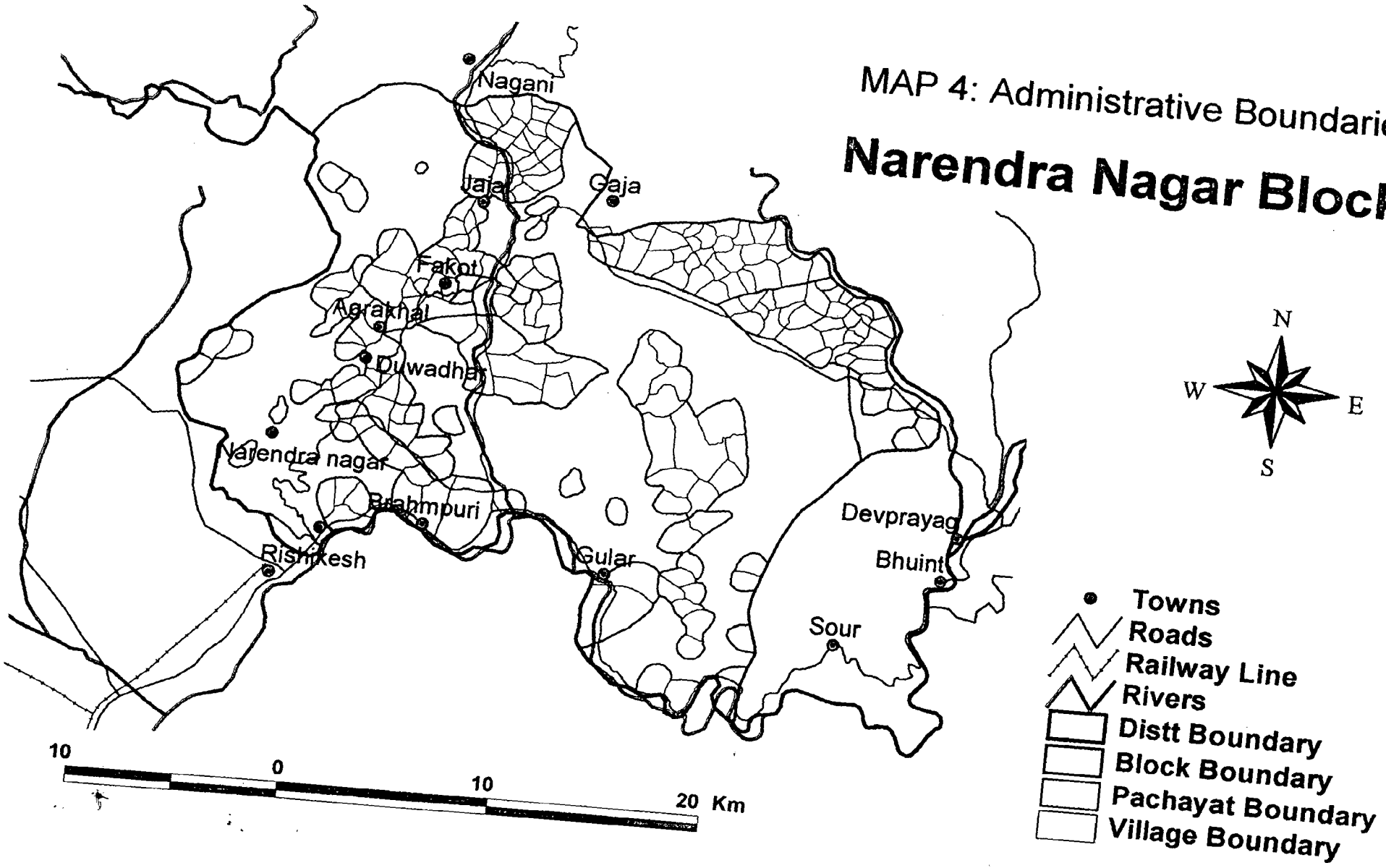
Source: Data collected from the block headquarter, Fakot.

V) Telecommunication facility:

Out of the total 208 villages of the block, almost 40% villages have telephone connections, while almost 60% villages do not have any telephone connection.

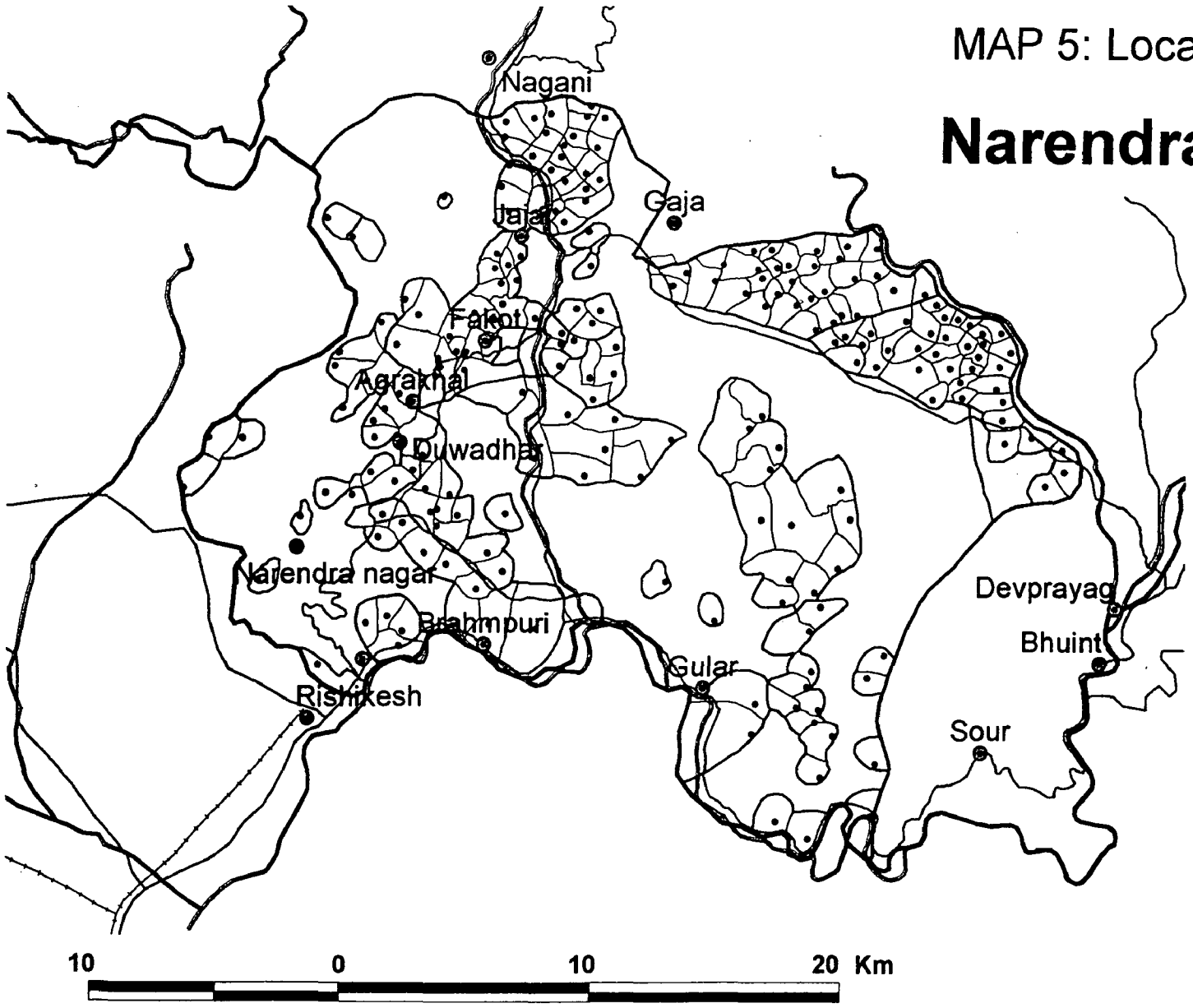
VI) Ration shop:

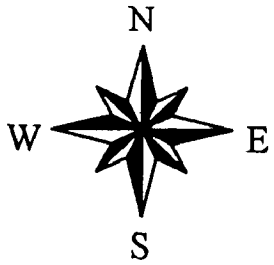
Narendra Nagar block has total 58 government ration shops and 2 cooperative ration shops. Government food go down in the block is at dhalwala near Rishikesh.


MAP 4: Administrative Boundaries
Narendra Nagar Block
Nagani
Jaja
Gaja
Fakot
Agrakhal
Duwadhar
Narendra nagar
Brahmpuri
Rishikesh
Gular
Devprayag
Bhuint
Sour
N
W
E
S
10
0
10
20 Km
Towns
Roads
Railway Line
Rivers
Distt Boundary
Block Boundary
Pachayat Boundary
Village Boundary

MAP 5: Location of Villages

Narendra Nagar Block





- Villages
- Towns
- Roads
- Railway Line
- Rivers
- Distt Boundary
- Block Boundary
- Pachayat Boundary
- Village Boundary

38	Banoli talli	11	22	28	50	0	0	12	3	15
39	Banoli malli	14	32	43	75	0	0	15	6	21
40	Daur mai kanda	95	282	273	555	38	0	117	81	198
41	Kail	25	73	83	156	0	0	53	43	96
42	Kudarna	96	289	285	574	47	0	204	110	314
43	Kharsh	46	95	136	231	6	0	50	14	64
44	Dewali	63	160	193	353	17	0	84	27	111
45	Kakhil	38	110	124	234	1	0	71	35	106
46	Fart	57	136	187	323	36	0	78	48	126
47	Bhatoli	10	21	18	39	39	0	12	1	13
48	Syud	61	201	161	362	29	0	125	44	169
49	Gwar	21	66	61	127	37	0	41	14	55
50	Kandari gaon	22	60	60	120	0	0	29	6	35
51	Bhainsark	39	93	103	196	0	0	63	15	78
52	Dagar	39	127	130	257	5	0	64	28	92
53	Talai	36	89	90	179	0	0	63	39	102
54	Aini	57	162	152	314	126	0	94	40	134
55	Bagar	6	8	11	19	0	0	4	2	6
56	Soni	54	150	172	322	30	0	97	34	131
57	Kheragad	39	109	97	206	8	0	40	5	45
58	Pildi	63	172	198	370	42	0	92	24	116
59	Sarswad	15	30	52	82	10	0	16	7	23
60	Chamol gaon	47	74	113	187	0	0	50	40	90
61	Bhekarki talli	34	81	89	170	19	0	39	14	53
62	Padodi patesari	15	30	31	61	0	0	18	5	23
63	Ars	30	66	79	145	97	0	40	17	57
64	Khakhoor	31	73	92	165	50	0	34	0	34
65	Dangoo	21	43	62	105	56	0	19	9	28
66	Bhaigarki	43	199	97	296	90	0	110	10	120
67	Agar	110	286	301	587	58	0	179	71	250
68	Semali katal	7	15	18	33	0	0	10	4	14
69	Chilogi tali	26	59	70	129	3	0	31	14	45
70	Adada	85	198	223	421	32	0	94	20	114
71	Pokhari	12	33	28	61	0	0	24	7	31
72	Chald gaon	16	56	49	105	0	0	24	0	24
73	Kasmoli	59	140	147	287	8	0	87	40	127
74	Kukhai malli	14	39	47	86	0	0	29	9	38
75	Kukhai talli	48	137	134	271	32	0	71	5	76
76	Banali	68	160	169	329	32	0	113	55	168
77	Basuee	43	108	122	230	67	0	53	18	71
78	Naur	39	105	118	223	0	0	49	9	58

79	Malas	19	37	56	93	3	0	21	18	39
80	Tachhla	27	121	55	176	0	0	82	11	93
81	Udar khet	11	28	29	57	7	0	22	5	27
82	Bemar	10	36	29	65	6	0	26	12	38
83	Katkot	26	92	83	175	0	0	52	23	75
84	Bhaitan	141	271	222	493	8	0	195	99	294
85	Pata	17	48	55	103	0	0	33	18	51
86	Jangleth	17	50	47	97	15	0	27	3	30
87	Hadi sera	39	78	82	160	69	0	38	12	50
88	Saldogi	59	182	169	351	11	0	86	26	112
89	Badeda malla	10	26	23	49	0	0	10	3	13
90	Bhair	6	19	19	38	0	0	12	2	14
91	Bandhan	8	32	31	63	0	0	6	0	6
92	Pungarh	7	26	19	45	0	0	3	0	3
93	Tapowan	375	936	552	1488	126	0	694	239	933
94	Shivpuri	39	93	58	151	5	0	48	8	56
95	Timli	198	730	696	1426	148	0	334	29	363
96	Dharkot	25	80	92	172	0	0	47	9	56
97	Neer	89	261	229	490	51	0	164	24	188
98	Talai lambadi	22	62	45	107	28	0	29	2	31
99	Pasar may kyark	27	57	64	121	0	0	17	3	20
100	Badera talla	44	123	134	257	246	0	72	23	95
101	Pater	4	14	12	26	0	0	7	0	7
102	Barkoat	14	35	34	69	0	0	26	12	38
103	Ghugtyani malli	21	54	58	112	24	0	37	24	61
104	Pathau	23	95	74	169	54	0	56	11	67
105	Ghughtiyani talli	28	91	86	177	0	0	65	13	78
106	Kuee	23	56	48	104	0	0	15	1	16
107	Jamari katal	8	22	26	48	37	0	12	9	21
108	Kyarki	28	101	82	183	0	0	52	11	63
109	Bawani	111	342	347	689	56	0	161	27	188
110	Matiyala	21	69	68	137	0	0	38	14	52
111	Mathiyali	154	422	460	882	56	0	204	18	222
112	Manjiyari	79	209	255	464	16	0	100	15	115
113	Pipri	29	71	89	160	44	0	26	9	35
114	Kyara	86	178	186	364	9	0	59	3	62
115	Jamola	64	126	178	304	0	0	63	5	68
116	Kotar	57	153	174	327	11	0	42	9	51
117	Ghighud	104	305	306	611	84	0	108	8	116
118	Banskatal	108	228	326	554	35	0	99	37	136
119	Bhairgarh	33	94	119	213	0	0	35	1	36

120	Bairai gaon	92	245	323	568	55	0	118	31	149
121	Chameli	96	267	222	489	12	0	146	34	180
122	Bhangala	57	131	172	303	53	0	72	23	95
123	Kakhoor	66	193	180	373	12	0	117	32	149
124	Lodashi	102	340	346	686	118	0	179	25	204
125	Lwail	95	297	287	584	177	0	148	24	172
126	Pajai gaon	49	101	145	246	23	0	40	22	62
127	Silkani	59	135	180	315	0	0	64	15	79
128	Atali	45	161	147	308	2	0	99	19	118
129	Singtali	42	84	111	195	5	0	39	27	66
130	Koudiyla	35	79	52	131	5	0	45	12	57
131	Maee	116	379	385	764	45	0	148	18	166
132	Naeelagamajhdhera	13	45	32	77	38	0	10	0	10
133	Gagalasi	91	262	307	569	0	0	159	43	202
134	Badeer	20	65	61	126	7	0	44	13	57
135	Chaudli	9	17	25	42	0	0	8	5	13
136	Mandiyari gaon	62	156	201	357	18	0	78	33	111
137	Bugala	58	154	170	324	27	0	106	55	161
138	Purwala	45	109	146	255	0	0	59	26	85
139	Mindath	197	640	591	1231	0	0	372	82	454
140	Mundala	62	164	181	345	0	0	91	24	115
141	Nasogi	44	109	119	228	15	0	50	24	74
142	Sasaman	120	339	308	647	30	1	179	41	220
143	Dawara	33	63	83	146	44	0	37	23	60
144	Fafaruwan gaon	5	16	16	32	32	0	8	0	8
145	Madewa	9	28	31	59	0	0	20	1	21
146	Maidhar	44	101	117	218	0	0	54	25	79
147	Amasari gaon	74	152	208	360	90	0	58	26	84
148	Jaycot	113	267	311	578	208	0	107	55	162
149	Jakholi	114	266	306	572	184	0	137	77	214
150	Khola	18	34	47	81	0	0	20	8	28
151	Thanyul	69	164	211	375	0	0	102	49	151
152	Bhatoli	26	56	67	123	0	0	37	20	57
153	Andarfi gaon	27	52	59	111	0	0	37	26	63
154	Dadreli	47	147	147	294	160	0	90	21	111
155	Kandari gaon	23	42	57	99	0	0	15	5	20
156	Kot	69	118	174	292	8	0	64	25	89
157	Payal gaon	40	97	117	214	26	0	44	13	57
158	Falsari	73	175	210	385	69	0	123	56	179
159	Vairola	168	352	346	698	60	0	218	114	332
160	Baman gaon	150	352	418	770	220	0	204	114	318

161	Palogi	22	52	59	111	34	0	31	18	49
162	Pokhkri	41	64	51	115	0	0	50	24	74
163	Bamankhola	10	16	26	42	0	0	9	11	20
164	Man gaon	53	117	147	264	71	0	65	35	100
165	Sountiyal gaon	38	67	103	170	0	0	47	19	66
166	Lawa	187	576	549	1125	76	0	387	130	517
167	Gumal gaon	48	124	146	270	0	0	78	51	129
168	Pendars	36	98	87	185	33	0	66	22	88
169	Adali	27	49	62	111	0	0	29	13	42
170	Sain	49	114	134	248	60	0	67	40	107
171	Kirada	60	144	176	320	111	0	88	45	133
172	Nouga magha talla	59	104	166	270	5	0	56	13	69
173	Gadil may gahar	40	69	106	175	0	0	39	26	65
174	Pali kolsari	104	205	243	448	52	0	100	43	143
175	Mayan gaon	38	60	84	144	0	0	21	8	29
176	Bhadani kapoori	61	178	205	383	36	0	90	27	117
177	Paweth	13	27	33	60	0	0	10	2	12
178	Sonsi	42	88	117	205	0	0	47	17	64
179	Ukhel	59	131	134	265	47	0	78	25	103
180	Kansur	105	205	245	450	0	0	81	44	125
181	Soundadi	37	87	114	201	5	0	73	39	112
182	Kothi malli talli	52	140	160	300	26	0	58	10	68
183	Digwali	30	67	75	142	7	0	25	2	27
184	Jamari	23	61	68	129	34	0	32	13	45
185	Khananamayfanika	149	338	410	748	43	0	179	75	254
186	Kharsara	88	181	237	418	95	0	95	33	128
187	Sakanyani	36	112	96	208	64	0	50	10	60
188	Thapaliyal gaon	22	48	50	98	13	0	15	1	16
189	Gudan gaon	6	8	10	18	0	0	2	1	3
190	Bag sari	31	68	82	150	21	0	25	3	28
191	Palkot	52	142	121	263	39	0	75	24	99
192	Guriyali bari	40	90	118	208	11	0	48	26	74
193	Guriyali chhoti	25	44	44	88	8	0	19	13	32
194	Maroda	31	57	67	124	3	0	35	9	44
195	Niger	53	120	159	279	17	0	71	11	82
196	Dhouldhar	10	25	24	49	0	0	17	3	20
197	Sera	9	18	21	39	0	0	8	1	9
198	Shrikot	58	108	171	279	9	0	59	16	75
199	Bhat gaon	44	126	141	267	22	0	37	3	40
200	Soud	41	72	114	186	0	0	26	7	33
201	Jeman gaon	13	36	33	69	51	0	14	2	16

202	Nail	30	52	86	138	0	0	30	16	46
203	Bhutali	31	67	86	153	24	0	41	15	56
204	Saundi	12	24	24	48	14	0	9	2	11
205	Ranakot	171	383	490	873	81	0	195	43	238
206	Ghorsad	35	78	88	166	54	0	25	2	27
207	Laser	41	96	127	223	9	0	67	44	111
Total		10441	26205	28525	54730	5861	1	14313	5085	19398

Source: Data collected from the Block Narendra Nagar Block Head Quarter, Fakot.

Table 5.11: Distance of villages from education facilities in Narendra Nagar Block

S.No.	Village Name	Education Facility Distance from Village (in K.M.)				
		Junior Basic School	Senior Basic Boys School	Senior Basic Girls School	Higher Secondary Boys School	Higher Secondary Girls School
1	Kaund	1.00	1.00	4.00	4.00	4.00
2	Temiar	0.00	3.00	3.00	3.00	36.00
3	Udkhanda	0.00	8.00	8.00	8.00	8.00
4	Than	0.00	3.00	3.00	7.00	7.00
5	Chiriyali malli	1.00	1.00	1.00	1.00	1.00
6	Kafol gaon	1.00	3.00	3.00	3.00	3.00
7	Chiriyali talli	1.00	1.00	1.00	1.00	1.00
8	Ampata	0.00	2.00	2.00	2.00	2.00
9	Gaindi	0.00	0.00	0.00	5.00	5.00
10	Pali kakar sari	0.00	3.00	3.00	3.00	3.00
11	Koti	0.00	2.00	3.00	3.00	3.00
12	Nala kanchan pur	1.00	3.00	3.00	3.00	3.00
13	Atali talli	1.00	3.00	3.00	3.00	3.00
14	Athli malli	0.00	2.00	2.00	2.00	2.00
15	Salam khet	4.00	4.00	4.00	4.00	4.00
16	Kuri	1.00	1.00	1.00	1.00	1.00
17	Bidon gaon	1.00	4.00	4.00	6.00	6.00
18	Teepali	0.00	0.00	0.00	4.00	4.00
19	Khakkar	2.00	5.00	5.00	7.00	7.00
20	Sunarkot	2.00	2.00	2.00	7.00	7.00
21	Kumali	1.00	1.00	1.00	4.00	4.00
22	Chaunpa	0.00	0.00	0.00	3.00	3.00
23	Pipaleth	0.00	1.00	1.00	3.00	3.00
24	Adwani	0.00	0.00	0.00	9.00	53.00

25	Amsari	0.00	3.00	8.00	8.00	41.00
26	Berani chhoti	0.00	1.00	1.00	4.00	53.00
27	Berani-bari	0.00	0.00	0.00	4.00	53.00
28	Gangsar gaon	0.00	3.00	3.00	3.00	30.00
29	Khatiyar	1.00	4.00	4.00	4.00	4.00
30	Maun	0.00	3.00	3.00	3.00	3.00
31	Bhandar gaon	1.00	2.00	2.00	2.00	2.00
32	Rampur	2.00	4.00	4.00	4.00	4.00
33	Sweer	0.00	0.00	0.00	0.00	0.00
34	Dadwa jaspur	1.00	1.00	1.00	6.00	6.00
35	Bara thali	1.00	11.00	11.00	2.00	2.00
36	Raudeli	0.00	4.00	4.00	3.00	25.00
37	Lamoli	1.00	2.00	2.00	2.00	26.00
38	Banoli talli	2.00	5.00	5.00	2.00	33.00
39	Banoli malli	2.00	5.00	5.00	2.00	33.00
40	Daur mai kanda	0.00	0.00	3.00	3.00	3.00
41	Kail	0.00	2.00	3.00	3.00	3.00
42	Kudarna	0.00	0.00	6.00	6.00	6.00
43	Kharsh	1.00	2.00	2.00	2.00	2.00
44	Dewali	0.00	1.00	1.00	1.00	1.00
45	Kakhil	0.00	0.00	19.00	0.00	19.0(
46	Fart	0.00	4.00	4.00	4.00	1.00
47	Bhatoli	1.00	2.00	2.00	2.00	2.00
48	Syud	0.00	2.00	2.00	2.00	1.00
49	Gwar	1.00	2.00	2.00	2.00	1.00
50	Kandari gaon	1.00	5.00	5.00	5.00	1.00
51	Bhainsark	0.00	2.00	2.00	2.00	2.00
52	Dagar	0.00	4.00	4.00	4.00	4.00
53	Talai	0.00	1.00	1.00	2.00	2.00
54	Aini	0.00	2.00	2.00	3.00	3.00
55	Bagar	1.00	4.00	4.00	4.00	4.00
56	Soni	0.00	2.00	2.00	2.00	2.00
57	Kheragad	1.00	2.00	2.00	2.00	2.00
58	Pildi	0.00	1.00	1.00	1.00	1.00
59	Sarswad	2.00	2.00	2.00	2.00	2.00
60	Chamol gaon	0.00	1.00	1.00	1.00	1.00
61	Bhekarki talli	0.00	0.00	0.00	0.00	0.00
62	Padodi patesari	1.00	1.00	1.00	1.00	1.00
63	Ars	0.00	1.00	1.00	1.00	1.00
64	Khakhoor	3.00	3.00	3.00	3.00	3.00
65	Dangoo	1.00	1.00	1.00	1.00	1.00

66	Bhaigarki	2.00	2.00	2.00	5.00	11.00
67	Agar	0.00	0.00	0.00	5.00	11.00
68	Semali katal	2.00	2.00	2.00	3.00	13.00
69	Chilogi tali	1.00	1.00	1.00	4.00	13.00
70	Adada	0.00	3.00	3.00	0.00	31.00
71	Pokhari	3.00	6.00	6.00	3.00	34.00
72	Chald gaon	2.00	6.00	6.00	9.00	17.00
73	Kasmoli	0.00	4.00	4.00	7.00	15.00
74	Kukhai malli	0.50	0.50	0.50	20.00	26.00
75	Kukhai talli	0.00	0.00	0.00	21.00	27.00
76	Banali	0.00	0.00	0.00	0.00	0.00
77	Basuee	2.00	10.00	10.00	3.00	21.00
78	Naur	0.50	9.00	9.00	5.00	21.00
79	Malas	0.00	7.00	7.00	3.00	20.00
80	Tachhla	3.00	7.00	7.00	3.00	20.00
81	Udar khet	1.00	8.00	8.00	6.00	23.00
82	Bemar	0.00	9.00	9.00	5.00	21.00
83	Katkot	2.00	6.00	6.00	3.00	19.00
84	Bhaitan	0.00	5.00	5.00	0.00	16.00
85	Pata	2.00	6.00	6.00	2.00	19.00
86	Jangleth	2.00	2.00	2.00	2.00	15.00
87	Hadi sera	0.00	5.00	5.00	5.00	22.00
88	Saldogi	0.00	3.00	3.00	2.00	14.00
89	Badeda malla	1.50	6.00	6.00	3.00	16.00
90	Bhair	0.50	10.00	10.00	3.00	22.00
91	Bandhan	5.00	5.00	5.00	11.00	29.00
92	Pungarh	5.00	5.00	5.00	11.00	29.00
93	Tapowan	0.00	0.00	0.00	2.00	4.00
94	Shivpuri	1.00	1.00	16.00	6.00	16.00
95	Timli	0.00	0.00	26.00	9.00	25.00
96	Dharkot	2.00	2.00	13.00	12.00	9.00
97	Neer	0.00	0.00	12.00	11.00	11.00
98	Dhaloowala	0.00	1.00	2.00	1.00	2.00
99	Talai lambadi	5.00	5.00	5.00	6.00	27.00
100	Pasar may kyark	0.00	5.00	5.00	6.00	27.00
101	Badera talla	0.00	0.00	6.00	5.00	6.00
102	Pater	2.00	5.00	10.00	12.00	7.00
103	Barkoat	3.00	4.00	11.00	13.00	8.00
104	Ghugtyani malli	2.00	2.00	5.00	4.00	6.00
105	Pathau	0.00	3.00	3.00	5.00	6.00
106	Ghughtiyani talli	2.00	2.00	4.00	4.00	5.00

107	Kuee	3.00	4.00	12.00	12.00	9.00
108	Jamari katal	2.00	2.00	5.00	5.00	6.00
109	Kyarki	0.00	5.00	8.00	8.00	8.00
110	Bawani	0.00	0.00	16.00	7.00	18.00
111	Matiyala	3.00	5.00	20.00	12.00	23.00
112	Mathiyali	0.00	4.00	4.00	10.00	37.00
113	Manjiyari	0.00	0.00	0.00	10.00	33.00
114	Pipri	1.00	3.00	37.00	3.00	37.00
115	Kyara	0.00	6.00	43.00	6.00	43.00
116	Jamola	3.00	6.00	42.00	6.00	42.00
117	Kotar	0.00	5.00	40.00	5.00	40.00
118	Ghighud	0.00	0.00	50.00	8.00	50.00
119	Banskatal	0.00	0.00	42.00	6.00	42.00
120	Bhairgarh	0.00	3.00	40.00	8.00	40.00
121	Bairai gaon	0.00	0.00	43.00	6.00	43.00
122	Chameli	0.00	2.00	40.00	5.00	40.00
123	Bhangala	0.00	0.00	40.00	0.00	40.00
124	Kakhoor	0.00	1.00	39.00	1.00	39.00
125	Lodashi	0.00	2.00	35.00	6.00	35.00
126	Lwail	0.00	0.00	40.00	10.00	40.00
127	Pajai gaon	0.00	0.00	46.00	5.00	46.00
128	Silkani	0.00	2.00	48.00	8.00	48.00
129	Atali	0.00	1.00	32.00	7.00	48.00
130	Singtali	0.00	0.00	34.00	8.00	50.00
131	Koudiyla	0.00	3.00	38.00	10.00	54.00
132	Maee	0.00	4.00	42.00	0.00	58.00
133	Naee laga majhdhera	1.00	4.00	42.00	1.00	58.00
134	Gagalasi	0.00	2.00	8.00	5.00	56.00
135	Badeer	0.00	0.00	10.00	5.00	56.00
136	Chaudli	2.00	4.00	6.00	2.00	56.00
137	Mandiyari gaon	0.00	4.00	38.00	1.00	54.00
138	Bugala	0.00	3.00	5.00	2.00	53.00
139	Purwala	0.00	0.00	44.00	6.00	60.00
140	Mindath	0.00	1.00	45.00	5.00	61.00
141	Mundala	0.00	2.00	5.00	2.00	52.00
142	Nasogi	0.00	3.00	0.00	3.00	54.00
143	Sasaman	0.00	2.00	42.00	5.00	58.00
144	Dawara	0.00	6.00	4.00	5.00	49.00
145	Fafaruwan gaon	2.00	8.00	8.00	3.00	54.00
146	Madewa	1.00	6.00	6.00	4.00	54.00

147	Maidhar	0.00	3.00	4.00	5.00	54.00
148	Amasari gaon	0.00	3.00	5.00	6.00	55.00
149	Jaycot	0.00	4.00	12.00	3.00	42.00
150	Jakholi	0.00	4.00	8.00	4.00	61.00
151	Khola	3.00	6.00	10.00	5.00	63.00
152	Thanyul	0.00	7.00	4.00	6.00	55.00
153	Bhatoli	0.00	7.00	5.00	5.00	49.00
154	Andarfi gaon	1.00	8.00	5.00	4.00	50.00
155	Dadreli	0.00	6.00	5.00	4.00	50.00
156	Kandari gaon	3.00	3.00	5.00	4.00	54.00
157	Kot	0.00	0.00	7.00	6.00	55.00
158	Payal gaon	2.00	2.00	8.00	7.00	57.00
159	Falsari	0.00	6.00	10.00	5.00	44.00
160	Vairola	0.00	6.00	5.00	0.00	59.00
161	Baman gaon	0.00	5.00	0.00	4.00	52.00
162	Palogi	2.00	4.00	3.00	3.00	51.00
163	Pokhkri	0.00	5.00	4.00	0.00	52.00
164	Bamankhola	1.00	7.00	5.00	1.00	52.00
165	Man gaon	2.00	9.00	7.00	2.00	54.00
166	Sountiyal gaon	0.00	9.00	8.00	3.00	54.00
167	Lawa	0.00	8.00	0.00	5.00	34.00
168	Gumal gaon	1.00	8.00	1.00	5.00	34.00
169	Pendars	2.00	0.00	8.00	5.00	62.00
170	Adali	2.00	7.00	6.00	4.00	61.00
171	Sain	0.00	0.00	8.00	4.00	60.00
172	Kirada	0.00	7.00	3.00	3.00	35.00
173	Nouga magha talla	0.00	2.00	21.00	2.00	24.00
174	Gadil may gahar	0.00	4.00	25.00	3.00	16.00
175	Pali kolsari	0.00	4.00	27.00	4.00	16.00
176	Mayan gaon	0.00	3.00	22.00	5.00	13.00
177	Bhadani kapoori	0.00	6.00	32.00	12.00	11.00
178	Paweth	2.00	2.00	13.00	8.00	26.00
179	Sonsi	0.00	3.00	12.00	8.00	25.00
180	Ukhel	0.00	2.00	14.00	6.00	21.00
181	Kansur	0.00	2.00	6.00	4.00	30.00
182	Soundadi	0.50	2.00	6.00	4.00	30.00
183	Kothi malli talli	2.00	2.00	18.00	3.00	18.00
184	Digwali	1.00	3.00	17.00	5.00	17.00
185	Jamari	0.00	4.00	19.00	3.00	18.00
186	Khanana mayfanika	0.00	0.00	26.00	11.00	16.00
187	Kharsara	0.00	0.00	16.00	5.00	16.00

188	Sakanyani	0.00	2.00	17.00	5.00	17.00
189	Thapaliyal gaon	2.00	6.00	24.00	3.00	18.00
190	Gudan gaon	1.00	4.00	21.00	5.00	14.00
191	Bag sari	0.50	8.00	26.00	4.00	15.00
192	Palkot	2.00	2.00	9.00	5.00	28.00
193	Guriyali bari	1.00	1.00	9.00	5.00	28.00
194	Guriyali chhoti	1.00	1.00	9.00	5.00	28.00
195	Maroda	3.00	3.00	22.00	7.00	12.00
196	Niger	0.00	4.00	23.00	11.00	10.00
197	Dhouldhar	2.00	2.00	25.00	9.00	8.00
198	Sera	4.00	4.00	23.00	8.00	6.00
199	Shrikot	0.00	6.00	27.00	5.00	16.00
200	Bhat gaon	1.00	1.50	15.00	6.00	19.00
201	Soud	3.00	4.00	16.00	8.00	21.00
202	Jeman gaon	1.00	2.00	17.00	6.00	19.00
203	Nail	0.00	4.00	17.00	5.00	24.00
204	Bhutali	2.00	2.00	16.00	5.00	23.00
205	Saundi	0.00	0.00	15.00	6.00	22.00
206	Ranakot	0.00	3.00	22.00	0.00	25.00
207	Ghorsad	1.00	3.00	16.00	8.00	23.00
208	Laser	0.00	3.00	15.00	7.00	21.00

Source: Data collected from the Block Narendra Nagar Block Head Quarter, Fakot.

Table 5.12: Distance of villages from other facilities in Narendra Nagar Block

S.No.	Village Name	Facility Distance from Village (in K.M.)				
		Bank	Block Headquarter	Vetenary Hospital	Fair Price Shop	Agri. Service Centre
1	Kaund	8.00	12.00	12.00	3.00	51.00
2	Temiar	5.00	19.00	5.00	0.00	19.00
3	Udkhanda	17.00	16.00	16.00	8.00	16.00
4	Than	18.00	17.00	17.00	9.00	17.00
5	Chiriyali malli	9.00	13.00	13.00	0.00	14.00
6	Kafol gaon	10.00	14.00	14.00	1.00	14.00
7	Chiriyali talli	9.00	13.00	13.00	0.00	14.00
8	Ampata	14.00	14.00	14.00	1.00	14.00
9	Gaindi	13.00	17.00	17.00	0.00	17.00
10	Pali kakar sari	12.00	16.00	16.00	4.00	16.00
11	Koti	12.00	16.00	16.00	4.00	16.00
12	Nala kanchan pur	12.00	16.00	16.00	4.00	16.00
13	Atali talli	11.00	15.00	15.00	3.00	15.00

14	Athli malli	12.00	16.00	16.00	4.00	16.00
15	Salam khet	19.00	24.00	24.00	12.00	24.00
16	Kuri	15.00	19.00	19.00	7.00	19.00
17	Bidon gaon	5.00	17.00	13.00	1.00	17.00
18	Teepali	9.00	13.00	13.00	1.00	13.00
19	Khakkar	13.00	17.00	17.00	5.00	17.00
20	Sunarkot	12.00	16.00	16.00	4.00	16.00
21	Kumali	9.00	12.00	12.00	1.00	12.00
22	Chaunpa	11.00	14.00	14.00	3.00	14.00
23	Pipaleth	13.00	13.00	13.00	3.00	13.00
24	Adwani	9.00	20.00	8.00	0.00	20.00
25	Amsari	8.00	24.00	8.00	2.00	24.00
26	Berani chhoti	14.00	26.00	4.00	2.00	26.00
27	Berani bari	14.00	26.00	4.00	2.00	26.00
28	Gangsar gaon	13.00	13.00	5.00	3.00	13.00
29	Khatiyar	13.00	17.00	17.00	2.00	11.00
30	Maun	14.00	18.00	18.00	1.00	10.00
31	Bhandar gaon	11.00	15.00	15.00	3.00	15.00
32	Rampur	10.00	14.00	14.00	2.00	14.00
33	Sweer	14.00	18.00	18.00	6.00	18.00
34	Dadwa jaspur	13.00	18.00	18.00	1.00	18.00
35	Bara thali	7.00	7.00	7.00	2.00	7.00
36	Raudeli	8.00	8.00	3.00	2.00	8.00
37	Lamoli	13.00	9.00	2.00	2.00	2.00
38	Banoli talli	16.00	16.00	2.00	2.00	2.00
39	Banoli malli	16.00	16.00	2.00	2.00	2.00
40	Daur mai kanda	3.00	20.00	3.00	3.00	20.00
41	Kail	13.00	53.00	13.00	3.00	26.00
42	Kudarna	10.00	56.00	10.00	0.00	29.00
43	Kharsh	10.00	11.00	10.00	1.00	35.00
44	Dewali	10.00	10.00	10.00	0.00	38.00
45	Kakhil	12.00	12.00	12.00	0.00	12.00
46	Fart	8.00	8.00	8.00	4.00	30.00
47	Bhatoli	9.00	9.00	9.00	2.00	22.00
48	Syud	7.00	7.00	7.00	1.00	29.00
49	Gwar	8.00	8.00	8.00	2.00	28.00
50	Kandari gaon	5.00	14.00	5.00	5.00	21.00
51	Bhainsark	8.00	8.00	8.00	2.00	8.00
52	Dagar	4.00	11.00	4.00	1.00	20.00
53	Talai	2.00	19.00	2.00	2.00	18.00
54	Aini	3.00	20.00	3.00	3.00	19.00

55	Bagar	4.00	13.00	4.00	2.00	21.00
56	Soni	7.00	11.00	11.00	1.00	11.00
57	Kheragad	6.00	12.00	6.00	1.00	12.00
58	Pildi	9.00	9.00	9.00	1.00	26.00
59	Sarswad	10.00	10.00	10.00	2.00	10.00
60	Chamol gaon	13.00	13.00	13.00	0.00	13.00
61	Bhekarki talli	12.00	15.00	15.00	0.00	15.00
62	Padodi patesari	13.00	16.00	16.00	1.00	16.00
63	Ars	12.00	13.00	13.00	1.00	13.00
64	Khakhoor	12.00	18.00	18.00	5.00	12.00
65	Dangoo	14.00	14.00	14.00	1.00	14.00
66	Bhaigarki	5.00	5.00	5.00	2.00	5.00
67	Agar	5.00	5.00	5.00	0.00	2.00
68	Semali katal	7.00	7.00	7.00	2.00	7.00
69	Chilogi tali	4.00	4.00	4.00	2.00	4.00
70	Adada	14.00	14.00	0.00	0.00	0.00
71	Pokhari	17.00	17.00	3.00	3.00	3.00
72	Chald gaon	9.00	9.00	9.00	5.00	9.00
73	Kasmoli	7.00	7.00	7.00	3.00	7.00
74	Kukhai malli	20.00	20.00	20.00	15.00	20.00
75	Kukhai talli	21.00	21.00	21.00	16.00	21.00
76	Banali	8.00	8.00	8.00	0.00	25.00
77	Basuee	5.00	5.00	5.00	3.00	5.00
78	Naur	5.00	5.00	5.00	5.00	5.00
79	Malas	3.00	3.00	3.00	3.00	3.00
80	Tachhla	3.00	3.00	3.00	3.00	3.00
81	Udar khet	6.00	6.00	6.00	6.00	6.00
82	Bemar	5.00	5.00	5.00	5.00	5.00
83	Katkot	3.00	3.00	3.00	3.00	3.00
84	Bhaitan	0.00	0.00	0.00	0.00	0.00
85	Pata	2.00	2.00	2.00	2.00	2.00
86	Jangleth	2.00	2.00	2.00	2.00	2.00
87	Hadi sera	5.00	5.00	5.00	1.00	5.00
88	Saldogi	10.00	8.00	8.00	3.00	8.00
89	Badeda malla	11.00	10.00	10.00	4.00	10.00
90	Bhair	6.00	6.00	6.00	6.00	6.00
91	Bandhan	12.00	12.00	12.00	5.00	12.00
92	Pungarh	12.00	12.00	12.00	5.00	12.00
93	Tapowan	0.00	37.00	0.00	0.00	5.00
94	Shivpuri	12.00	39.00	18.00	0.00	16.00
95	Timli	9.00	54.00	28.00	0.00	25.00

96	Dharkot	11.00	27.00	10.00	3.00	13.00
97	Neer	10.00	23.00	8.00	0.00	12.00
98	Dhaloowala	1.00	33.00	1.00	0.00	2.00
99	Talai lambadi	10.00	10.00	10.00	0.00	10.00
100	Pasar may kyark	15.00	15.00	15.00	0.00	15.00
101	Badera talla	12.00	23.00	12.00	5.00	26.00
102	Pater	11.00	25.00	6.00	6.00	10.00
103	Barkoat	10.00	26.00	6.00	6.00	11.00
104	Ghugtyani malli	2.00	35.00	2.00	2.00	6.00
105	Pathau	3.00	35.00	3.00	3.00	5.00
106	Ghughtiyani talli	1.00	37.00	1.00	1.00	6.00
107	Kuee	10.00	41.00	8.00	5.00	12.00
108	Jamari katal	5.00	38.00	2.00	3.00	5.00
109	Kyarki	10.00	39.00	10.00	5.00	8.00
110	Bawani	14.00	51.00	22.00	3.00	18.00
111	Matiyala	19.00	57.00	25.00	5.00	23.00
112	Mathiyali	20.00	20.00	20.00	0.00	19.00
113	Manjiyari	16.00	16.00	16.00	0.00	15.00
114	Pipri	18.00	71.00	18.00	2.00	37.00
115	Kyara	23.00	78.00	23.00	0.00	43.00
116	Jamola	22.00	77.00	22.00	2.00	42.00
117	Kotar	20.00	73.00	20.00	0.00	40.00
118	Ghighud	24.00	83.00	24.00	0.00	50.00
119	Banskatal	20.00	75.00	20.00	0.00	42.00
120	Bhairgarh	22.00	73.00	22.00	2.00	40.00
121	Bairai gaon	22.00	76.00	22.00	0.00	43.00
122	Chameli	7.00	73.00	7.00	3.00	40.00
123	Bhangala	18.00	73.00	18.00	0.00	40.00
124	Kakhoor	17.00	72.00	17.00	1.00	39.00
125	Lodashi	6.00	68.00	6.00	0.00	35.00
126	Lwail	10.00	73.00	10.00	0.00	40.00
127	Pajai gaon	19.00	79.00	19.00	3.00	46.00
128	Silkani	21.00	81.00	21.00	4.00	48.00
129	Atali	0.00	68.00	6.00	0.00	34.00
130	Singtali	3.00	69.00	2.00	0.00	36.00
131	Koudiyla	6.00	71.00	0.00	2.00	38.00
132	Maee	14.00	75.00	4.00	0.00	42.00
133	Naee laga majhdhera	14.00	75.00	4.00	1.00	42.00
134	Gagalasi	7.00	74.00	2.00	0.00	44.00
135	Badeer	7.00	74.00	3.00	2.00	42.00
136	Chaudli	12.00	75.00	3.00	1.00	42.00

137	Mandiyari gaon	12.00	75.00	3.00	0.00	42.00
138	Bugala	11.00	74.00	1.00	0.00	41.00
139	Purwala	12.00	77.00	6.00	0.00	44.00
140	Mindath	14.00	80.00	8.00	0.00	46.00
141	Mundala	11.00	73.00	2.00	0.00	40.00
142	Nasogi	8.00	76.00	0.00	0.00	42.00
143	Sasaman	11.00	76.00	5.00	0.00	43.00
144	Dawara	8.00	40.00	8.00	0.00	36.00
145	Fafaruwan gaon	15.00	47.00	15.00	3.00	47.00
146	Madewa	15.00	48.00	7.00	3.00	48.00
147	Maidhar	6.00	45.00	6.00	2.00	45.00
148	Amasari gaon	6.00	45.00	6.00	2.00	45.00
149	Jaycot	2.00	34.00	2.00	2.00	46.00
150	Jakholi	3.00	54.00	3.00	2.00	54.00
151	Khola	4.00	55.00	4.00	3.00	55.00
152	Thanyul	16.00	46.00	16.00	4.00	42.00
153	Bhatoli	8.00	40.00	8.00	1.00	40.00
154	Andarfi gaon	9.00	41.00	8.00	1.00	40.00
155	Dadreli	10.00	41.00	8.00	1.00	41.00
156	Kandari gaon	7.00	46.00	14.00	2.00	46.00
157	Kot	5.00	46.00	5.00	0.00	46.00
158	Payal gaon	4.00	47.00	4.00	1.00	47.00
159	Falsari	4.00	36.00	4.00	4.00	34.00
160	Vairola	0.00	51.00	0.00	0.00	51.00
161	Baman gaon	10.00	42.00	12.00	1.00	41.00
162	Palogi	12.00	44.00	12.00	1.00	44.00
163	Pokhkri	12.00	44.00	12.00	0.00	44.00
164	Bamankhola	13.00	45.00	13.00	1.00	45.00
165	Man gaon	14.00	46.00	14.00	2.00	46.00
166	Sountiyal gaon	15.00	47.00	15.00	3.00	47.00
167	Lawa	4.00	56.00	4.00	0.00	56.00
168	Gumal gaon	4.00	56.00	4.00	1.00	56.00
169	Pendars	4.00	55.00	6.00	3.00	55.00
170	Adali	2.00	53.00	4.00	2.00	53.00
171	Sain	3.00	56.00	4.00	0.00	56.00
172	Kirada	2.00	54.00	2.00	0.00	54.00
173	Nouga magha talla	16.00	67.00	15.00	1.00	67.00
174	Gadil may gahar	22.00	75.00	15.00	1.00	75.00
175	Pali kolsari	22.00	76.00	15.00	2.00	75.00
176	Mayan gaon	18.00	69.00	13.00	1.00	69.00
177	Bhadani kapoori	31.00	83.00	10.00	5.00	83.00

178	Paweth	8.00	60.00	8.00	3.00	60.00
179	Sonsi	7.00	59.00	7.00	2.00	59.00
180	Ukhel	13.00	64.00	12.00	0.00	64.00
181	Kansur	3.00	56.00	7.00	1.00	56.00
182	Soundadi	3.00	56.00	7.00	0.00	56.00
183	Kothi malli talli	19.00	69.00	17.00	2.00	69.00
184	Digwali	18.00	72.00	17.00	2.00	72.00
185	Jamari	19.00	72.00	16.00	3.00	72.00
186	Khanana mayfanika	23.00	75.00	16.00	0.00	75.00
187	Kharsara	16.00	71.00	15.00	0.00	71.00
188	Sakanyani	17.00	71.00	16.00	1.00	71.00
189	Thapaliyal gaon	22.00	75.00	16.00	2.00	75.00
190	Gudan gaon	18.00	69.00	13.00	1.00	69.00
191	Bag sari	21.00	71.00	15.00	0.00	71.00
192	Palkot	5.00	58.00	6.00	0.00	58.00
193	Guriyali bari	5.00	58.00	6.00	1.00	58.00
194	Guriyali chhoti	5.00	58.00	6.00	1.00	58.00
195	Maroda	19.00	71.00	12.00	1.00	71.00
196	Niger	22.00	75.00	9.00	9.00	75.00
197	Dhouldhar	24.00	70.00	7.00	7.00	70.00
198	Sera	26.00	79.00	5.00	5.00	79.00
199	Shrikot	23.00	76.00	16.00	0.00	76.00
200	Bhat gaon	15.00	66.00	14.00	0.00	66.00
201	Soud	16.00	67.00	15.00	2.00	67.00
202	Jeman gaon	15.00	66.00	14.00	2.00	66.00
203	Nail	16.00	62.00	15.00	4.00	62.00
204	Bhutali	15.00	66.00	13.00	3.00	66.00
205	Saundi	14.00	65.00	13.00	0.00	65.00
206	Ranakot	18.00	68.00	17.00	0.00	68.00
207	Ghorsad	14.00	66.00	13.00	2.00	66.00
208	Laser	12.00	65.00	12.00	0.00	65.00

Source: Data collected from the Block Narendra Nagar Block Head Quarter, Fakot.

Table 5.13: Distance of villages from transport and communication facilities in Narendra Nagar Block

S.No.	Village Name	Facility Distance from Village (in K.M.)				
		Pakka Road	Railway Station	Bus Station	Post Office	Public Telephone
1	Kaund	1.00	51.00	1.00	4.00	15.00
2	Temiar	5.00	52.00	5.00	5.00	5.00
3	Udkhanda	8.00	32.00	8.00	8.00	16.00
4	Than	9.00	32.00	9.00	9.00	17.00

5	Chiriyali malli	0.00	48.00	0.00	1.00	13.00
6	Kafol gaon	1.00	47.00	1.00	3.00	14.00
7	Chiriyali talli	0.00	48.00	0.00	1.00	13.00
8	Ampata	1.00	48.00	1.00	2.00	14.00
9	Gaindi	0.00	54.00	0.00	2.00	17.00
10	Pali kakar sari	2.00	51.00	2.00	5.00	16.00
11	Koti	4.00	48.00	4.00	5.00	17.00
12	Nala kanchan pur	4.00	50.00	4.00	5.00	16.00
13	Atali talli	3.00	50.00	3.00	4.00	15.00
14	Athli malli	4.00	51.00	4.00	5.00	16.00
15	Salam khet	7.00	68.00	7.00	13.00	15.00
16	Kuri	5.00	54.00	5.00	8.00	19.00
17	Bidon gaon	1.00	52.00	1.00	5.00	15.00
18	Teepali	1.00	49.00	1.00	2.00	13.00
19	Khakkar	5.00	51.00	5.00	5.00	17.00
20	Sunarkot	4.00	51.00	4.00	5.00	16.00
21	Kumali	1.00	47.00	1.00	3.00	12.00
22	Chaunpa	3.00	46.00	3.00	3.00	14.00
23	Pipaleth	3.00	38.00	3.00	3.00	13.00
24	Adwani	0.00	53.00	0.00	3.00	3.00
25	Amsari	2.00	57.00	2.00	3.00	3.00
26	Berani chhoti	4.00	57.00	4.00	0.00	0.00
27	Berani bari	4.00	57.00	4.00	0.00	0.00
28	Gangsar gaon	3.00	46.00	3.00	2.00	2.00
29	Khatiyar	3.00	62.00	3.00	4.00	11.00
30	Maun	2.00	63.00	2.00	3.00	10.00
31	Bhandar gaon	1.00	50.00	1.00	4.00	15.00
32	Rampur	2.00	49.00	2.00	3.00	14.00
33	Sweer	4.00	53.00	4.00	7.00	18.00
34	Dadwa jaspur	1.00	53.00	1.00	1.00	18.00
35	Bara thali	1.00	39.00	1.00	2.00	2.00
36	Raudeli	8.00	41.00	8.00	3.00	8.00
37	Lamoli	9.00	46.00	9.00	2.00	2.00
38	Banoli talli	12.00	49.00	12.00	2.00	2.00
39	Banoli malli	12.00	49.00	12.00	2.00	2.00
40	Daur mai kanda	3.00	19.00	3.00	3.00	3.00
41	Kail	3.00	12.00	3.00	3.00	3.00
42	Kudarna	6.00	15.00	6.00	6.00	6.00
43	Kharsh	7.00	35.00	7.00	1.00	7.00
44	Dewali	5.00	38.00	5.00	0.00	5.00
45	Kakhil	7.00	35.00	7.00	7.00	7.00

87	Hadi sera	5.00	38.00	5.00	5.00	5.00
88	Saldogi	3.00	31.00	3.00	3.00	3.00
89	Badeda malla	5.00	33.00	5.00	4.00	4.00
90	Bhair	0.50	39.00	0.50	6.00	6.00
91	Bandhan	12.00	37.00	12.00	5.00	12.00
92	Pungarh	12.00	37.00	12.00	5.00	12.00
93	Tapowan	0.00	5.00	0.00	0.00	1.00
94	Shivpuri	0.00	16.00	0.00	0.00	0.00
95	Timli	9.00	25.00	9.00	0.00	9.00
96	Dharkot	8.00	13.00	5.00	8.00	8.00
97	Neer	6.00	12.00	6.00	10.00	8.00
98	Dhaloowala	0.00	2.00	0.00	1.00	1.00
99	Talai lambadi	10.00	43.00	10.00	6.00	6.00
100	Pasar may kyark	15.00	48.00	15.00	6.00	6.00
101	Badera talla	6.00	26.00	6.00	5.00	6.00
102	Pater	6.00	10.00	6.00	6.00	7.00
103	Barkoat	7.00	11.00	8.00	6.00	8.00
104	Ghugtyani malli	2.00	6.00	2.00	2.00	2.00
105	Pathau	3.00	5.00	3.00	3.00	3.00
106	Ghughtiyani talli	1.00	6.00	1.00	1.00	1.00
107	Kuee	3.00	12.00	3.00	10.00	8.00
108	Jamari katal	2.00	5.00	2.00	3.00	4.00
109	Kyarki	2.00	8.00	2.00	5.00	8.00
110	Bawani	10.00	18.00	2.00	3.00	18.00
111	Matiyala	7.00	23.00	7.00	5.00	23.00
112	Mathiyali	19.00	41.00	19.00	4.00	19.00
113	Manjiyari	15.00	37.00	15.00	0.00	15.00
114	Pipri	18.00	37.00	18.00	2.00	18.00
115	Kyara	23.00	43.00	23.00	0.00	23.00
116	Jamola	22.00	42.00	22.00	2.00	22.00
117	Kotar	20.00	40.00	20.00	3.00	20.00
118	Ghighud	24.00	50.00	24.00	5.00	24.00
119	Banskatal	20.00	42.00	20.00	0.00	20.00
120	Bhairgarh	22.00	40.00	22.00	2.00	22.00
121	Bairai gaon	5.00	43.00	5.00	0.00	22.00
122	Chameli	7.00	40.00	7.00	5.00	7.00
123	Bhangala	18.00	40.00	18.00	1.00	18.00
124	Kakhoor	17.00	39.00	17.00	0.00	17.00
125	Lodashi	3.00	35.00	3.00	3.00	6.00
126	Lwail	0.00	40.00	0.00	5.00	10.00
127	Pajai gaon	19.00	46.00	19.00	2.00	19.00

5	Chiriyali malli	0.00	48.00	0.00	1.00	13.00
6	Kafol gaon	1.00	47.00	1.00	3.00	14.00
7	Chiriyali talli	0.00	48.00	0.00	1.00	13.00
8	Ampata	1.00	48.00	1.00	2.00	14.00
9	Gaindi	0.00	54.00	0.00	2.00	17.00
10	Pali kakar sari	2.00	51.00	2.00	5.00	16.00
11	Koti	4.00	48.00	4.00	5.00	17.00
12	Nala kanchan pur	4.00	50.00	4.00	5.00	16.00
13	Atali talli	3.00	50.00	3.00	4.00	15.00
14	Athli malli	4.00	51.00	4.00	5.00	16.00
15	Salam khet	7.00	68.00	7.00	13.00	15.00
16	Kuri	5.00	54.00	5.00	8.00	19.00
17	Bidon gaon	1.00	52.00	1.00	5.00	15.00
18	Teepali	1.00	49.00	1.00	2.00	13.00
19	Khakkar	5.00	51.00	5.00	5.00	17.00
20	Sunarkot	4.00	51.00	4.00	5.00	16.00
21	Kumali	1.00	47.00	1.00	3.00	12.00
22	Chaunpa	3.00	46.00	3.00	3.00	14.00
23	Pipaleth	3.00	38.00	3.00	3.00	13.00
24	Adwani	0.00	53.00	0.00	3.00	3.00
25	Amsari	2.00	57.00	2.00	3.00	3.00
26	Berani chhoti	4.00	57.00	4.00	0.00	0.00
27	Berani bari	4.00	57.00	4.00	0.00	0.00
28	Gangsar gaon	3.00	46.00	3.00	2.00	2.00
29	Khatiyar	3.00	62.00	3.00	4.00	11.00
30	Maun	2.00	63.00	2.00	3.00	10.00
31	Bhandar gaon	1.00	50.00	1.00	4.00	15.00
32	Rampur	2.00	49.00	2.00	3.00	14.00
33	Sweer	4.00	53.00	4.00	7.00	18.00
34	Dadwa jaspur	1.00	53.00	1.00	1.00	18.00
35	Bara thali	1.00	39.00	1.00	2.00	2.00
36	Raudeli	8.00	41.00	8.00	3.00	8.00
37	Lamoli	9.00	46.00	9.00	2.00	2.00
38	Banoli talli	12.00	49.00	12.00	2.00	2.00
39	Banoli malli	12.00	49.00	12.00	2.00	2.00
40	Daur mai kanda	3.00	19.00	3.00	3.00	3.00
41	Kail	3.00	12.00	3.00	3.00	3.00
42	Kudarna	6.00	15.00	6.00	6.00	6.00
43	Kharsh	7.00	35.00	7.00	1.00	7.00
44	Dewali	5.00	38.00	5.00	0.00	5.00
45	Kakhil	7.00	35.00	7.00	7.00	7.00

46	Fart	4.00	30.00	4.00	3.00	4.00
47	Bhatoli	2.00	22.00	2.00	2.00	2.00
48	Syud	1.00	29.00	1.00	1.00	1.00
49	Gwar	1.00	28.00	4.00	1.00	2.00
50	Kandari gaon	5.00	21.00	5.00	5.00	5.00
51	Bhainsark	2.00	27.00	2.00	2.00	2.00
52	Dagar	1.00	20.00	1.00	4.00	4.00
53	Talai	2.00	18.00	2.00	2.00	2.00
54	Aini	3.00	19.00	3.00	3.00	3.00
55	Bagar	1.00	20.00	1.00	4.00	4.00
56	Soni	1.00	23.00	1.00	3.00	3.00
57	Kheragad	1.00	22.00	1.00	2.00	2.00
58	Pildi	1.00	26.00	1.00	1.00	1.00
59	Sarswad	2.00	27.00	2.00	2.00	2.00
60	Chamol gaon	5.00	30.00	5.00	0.00	0.00
61	Bhekarki talli	5.00	28.00	5.00	1.00	1.00
62	Padodi patesari	6.00	29.00	6.00	1.00	1.00
63	Ars	5.00	28.00	5.00	2.00	2.00
64	Khakhoor	10.00	12.00	10.00	7.00	7.00
65	Dangoo	6.00	31.00	6.00	1.00	1.00
66	Bhaigarki	2.00	30.00	2.00	2.00	2.00
67	Agar	0.00	28.00	0.00	2.00	2.00
68	Semali katal	2.00	30.00	2.00	2.00	2.00
69	Chilogi tali	1.00	30.00	1.00	2.00	2.00
70	Adada	10.00	45.00	10.00	0.00	0.00
71	Pokhari	13.00	50.00	13.00	3.00	3.00
72	Chald gaon	5.00	33.00	5.00	5.00	5.00
73	Kasmoli	3.00	31.00	3.00	3.00	3.00
74	Kukhai malli	15.00	43.00	15.00	15.00	15.00
75	Kukhai talli	16.00	44.00	16.00	16.00	16.00
76	Banali	0.00	25.00	0.00	0.00	0.00
77	Basuee	0.50	38.00	2.00	3.00	3.00
78	Naur	1.00	38.00	1.00	5.00	5.00
79	Malas	1.00	36.00	1.00	3.00	3.00
80	Tachhla	0.00	37.00	0.00	3.00	3.00
81	Udar khet	1.00	39.00	1.00	6.00	6.00
82	Bemar	0.00	38.00	0.00	5.00	5.00
83	Katkot	3.00	36.00	3.00	3.00	3.00
84	Bhaitan	0.00	33.00	0.00	0.00	0.00
85	Pata	0.50	35.00	0.50	2.00	2.00
86	Jangleth	1.00	32.00	1.00	2.00	2.00

87	Hadi sera	5.00	38.00	5.00	5.00	5.00
88	Saldogi	3.00	31.00	3.00	3.00	3.00
89	Badeda malla	5.00	33.00	5.00	4.00	4.00
90	Bhair	0.50	39.00	0.50	6.00	6.00
91	Bandhan	12.00	37.00	12.00	5.00	12.00
92	Pungarh	12.00	37.00	12.00	5.00	12.00
93	Tapowan	0.00	5.00	0.00	0.00	1.00
94	Shivpuri	0.00	16.00	0.00	0.00	0.00
95	Timli	9.00	25.00	9.00	0.00	9.00
96	Dharkot	8.00	13.00	5.00	8.00	8.00
97	Neer	6.00	12.00	6.00	10.00	8.00
98	Dhaloowala	0.00	2.00	0.00	1.00	1.00
99	Talai lambadi	10.00	43.00	10.00	6.00	6.00
100	Pasar may kyark	15.00	48.00	15.00	6.00	6.00
101	Badera talla	6.00	26.00	6.00	5.00	6.00
102	Pater	6.00	10.00	6.00	6.00	7.00
103	Barkoat	7.00	11.00	8.00	6.00	8.00
104	Ghugtyani malli	2.00	6.00	2.00	2.00	2.00
105	Pathau	3.00	5.00	3.00	3.00	3.00
106	Ghughtiyani talli	1.00	6.00	1.00	1.00	1.00
107	Kuee	3.00	12.00	3.00	10.00	8.00
108	Jamari katal	2.00	5.00	2.00	3.00	4.00
109	Kyarki	2.00	8.00	2.00	5.00	8.00
110	Bawani	10.00	18.00	2.00	3.00	18.00
111	Matiyala	7.00	23.00	7.00	5.00	23.00
112	Mathiyali	19.00	41.00	19.00	4.00	19.00
113	Manjiyari	15.00	37.00	15.00	0.00	15.00
114	Pipri	18.00	37.00	18.00	2.00	18.00
115	Kyara	23.00	43.00	23.00	0.00	23.00
116	Jamola	22.00	42.00	22.00	2.00	22.00
117	Kotar	20.00	40.00	20.00	3.00	20.00
118	Ghighud	24.00	50.00	24.00	5.00	24.00
119	Banskatal	20.00	42.00	20.00	0.00	20.00
120	Bhairgarh	22.00	40.00	22.00	2.00	22.00
121	Bairai gaon	5.00	43.00	5.00	0.00	22.00
122	Chameli	7.00	40.00	7.00	5.00	7.00
123	Bhangala	18.00	40.00	18.00	1.00	18.00
124	Kakhoor	17.00	39.00	17.00	0.00	17.00
125	Lodashi	3.00	35.00	3.00	3.00	6.00
126	Lwail	0.00	40.00	0.00	5.00	10.00
127	Pajai gaon	19.00	46.00	19.00	2.00	19.00

128	Silkani	21.00	48.00	21.00	0.00	21.00
129	Atali	0.00	31.00	0.00	0.00	6.00
130	Singtali	0.00	32.00	0.00	2.00	2.00
131	Koudiyla	0.00	34.00	0.00	0.00	0.00
132	Maee	0.00	42.00	0.00	0.00	8.00
133	Naee laga majhdhera	0.00	42.00	0.50	1.00	8.00
134	Gagalasi	5.00	44.00	8.00	4.00	4.00
135	Badeer	3.00	40.00	5.00	3.00	3.00
136	Chaudli	1.00	42.00	1.00	1.00	7.00
137	Mandiyari gaon	18.00	42.00	42.00	0.00	7.00
138	Bugala	2.00	42.00	2.00	1.00	6.00
139	Purwala	6.00	31.00	10.00	2.00	6.00
140	Mindath	8.00	32.00	8.00	0.00	8.00
141	Mundala	2.00	41.00	2.00	0.00	6.00
142	Nasogi	3.00	42.00	3.00	2.00	6.00
143	Sasaman	5.00	26.00	5.00	5.00	5.00
144	Dawara	0.00	70.00	0.00	3.00	8.00
145	Fafaruwan gaon	4.00	80.00	4.00	3.00	15.0(
146	Madewa	3.00	74.00	3.00	2.00	15.0(
147	Maidhar	2.00	78.00	2.00	1.00	7.00
148	Amasari gaon	3.00	79.00	3.00	0.00	6.00
149	Jaycot	0.00	66.00	0.00	2.00	2.00
150	Jakholi	3.00	104.00	3.00	0.00	3.00
151	Khola	4.00	105.00	4.00	1.00	4.00
152	Thanyul	1.00	74.00	1.00	4.00	14.0(
153	Bhatoli	0.00	70.00	0.00	3.00	8.00
154	Andarfi gaon	0.00	71.00	1.00	3.00	9.00
155	Dadreli	0.00	71.00	1.00	2.00	8.00
156	Kandari gaon	0.00	78.00	0.00	2.00	14.00
157	Kot	0.00	80.00	0.00	1.00	5.00
158	Payal gaon	0.00	82.00	0.00	2.00	4.00
159	Falsari	0.00	68.00	0.00	4.00	4.00
160	Vairola	0.00	84.00	0.00	0.00	0.00
161	Baman gaon	0.00	70.00	1.00	2.00	10.00
162	Palogi	0.00	76.00	0.00	1.00	12.00
163	Pokhkri	0.00	76.00	0.00	0.00	12.00
164	Bamankhola	2.00	77.00	2.00	1.00	13.00
165	Man gaon	3.00	79.00	3.00	2.00	14.00
166	Sountiyal gaon	4.00	82.00	4.00	3.00	15.00
167	Lawa	2.00	101.00	2.00	0.00	4.00
168	Gumal gaon	2.00	101.00	2.00	1.00	4.00

169	Pendars	0.00	82.00	0.00	2.00	4.00
170	Adali	2.00	80.00	2.00	1.00	3.00
171	Sain	2.00	83.00	2.00	0.00	3.00
172	Kirada	0.00	99.00	0.00	2.00	2.00
173	Nouga magha talla	0.00	90.00	0.00	1.00	15.00
174	Gadil may gahar	3.00	86.00	3.00	3.00	3.00
175	Pali kolsari	3.00	86.00	3.00	2.00	3.00
176	Mayan gaon	0.00	85.00	3.00	1.00	1.00
177	Bhadani kapoori	4.00	80.00	4.00	11.00	11.00
178	Paweth	3.00	92.00	3.00	2.00	7.00
179	Sonsi	0.00	94.00	0.00	3.00	7.00
180	Ukhel	1.00	89.00	1.00	1.00	12.00
181	Kansur	0.00	97.00	0.00	2.00	4.00
182	Soundadi	0.00	97.00	0.00	2.00	4.00
183	Kothi malli talli	2.00	85.00	2.00	0.00	5.00
184	Digwali	3.00	92.00	3.00	1.00	5.00
185	Jamari	3.00	83.00	3.00	2.00	4.00
186	Khanana mayfanika	4.00	79.00	4.00	4.00	4.00
187	Kharsara	0.00	83.00	0.00	2.00	3.00
188	Sakanyani	1.00	87.00	1.00	1.00	4.00
189	Thapaliyal gaon	3.00	86.00	3.00	2.00	3.00
190	Gudan gaon	0.00	86.00	0.00	1.00	1.00
191	Bag sari	3.00	82.00	3.00	3.00	3.00
192	Palkot	1.00	95.00	1.00	0.00	5.00
193	Guriyali bari	1.00	95.00	1.00	1.00	5.00
194	Guriyali chhoti	1.00	92.00	1.00	1.00	5.00
195	Maroda	0.00	86.00	0.00	0.00	0.00
196	Niger	0.00	78.00	0.00	3.00	3.00
197	Dhouldhar	0.00	76.00	0.00	5.00	5.00
198	Sera	0.00	74.00	0.00	7.00	7.00
199	Shrikot	4.00	98.00	4.00	3.00	4.00
200	Bhat gaon	0.00	90.00	0.00	3.00	14.00
201	Soud	3.00	94.00	3.00	4.00	15.00
202	Jeman gaon	0.00	92.00	0.00	2.00	14.00
203	Nail	4.00	91.00	4.00	3.00	15.00
204	Bhutali	3.00	86.00	3.00	2.00	14.00
205	Saundi	1.00	86.00	1.00	0.00	13.00
206	Ranakot	0.00	88.00	0.00	0.00	17.00
207	Ghorsad	3.00	91.00	3.00	2.00	13.00
208	Laser	0.00	94.00	0.00	1.00	12.00

The data needs for GIS application could mainly depend upon the end goal of the application. GIS data consist of two elements, namely spatial and non-spatial. The first one gives the information about the feature's geometric orientation, shape, size and relative position with respect to other features, and second qualifies information about various attributes like area, length, population, etc. Spatial data is stored in X Y co-ordinates and non-spatial data is organized in alphanumeric fields. [4]

In present study, data (spatial and non-spatial) is collected at three levels i.e. State, District and Block level and organized separately.

6.1.SPATIAL DATABASE DESIGN & ORGANIZATION:

- Delineating the study area spatially.
- Identification and collection of spatial data consisting of Survey of India Toposheets of 1:250,000 and 1:50,000 scale, map of Uttaranchal State, Tehri Garhwal District and Narendra Nagar Block collected from various government organizations.
- Creation of maps using cartographic techniques.
- Creation of digital maps using Arc/Info software, which involves
    - Digitization of scanned maps.
    - On screen digitization.
    - Performing clean build operation to create topology.
    - Projection and transformation of coverage into real world co-ordinates following the same projection system as adopted by SOI Toposheets i.e. Polyconic Projection and choosing spheroid as Modeverest.

The database is designed and organized in a manner such that it minimizes the data redundancy and maximizes the multiplicity of usage of each data element. A summary list of the data elements is given in table 5.1.

Table 5.1: Elements of spatial database.

State Level	**District Level**	**Block Level**
Land-use / cover	Land-use / cover	Land-use / cover
Drainage/ canals, Rivers and Streams	Drainage/ canals, Rivers and Streams	Drainage/ canals, Rivers and Streams
Lakes and Glaciers	Lakes and Glaciers	Lakes and Glaciers
Elevation Contours/ Spot Heights	Elevation Contours/ Spot Heights	Elevation Contours/ Spot Heights
District Boundaries	District Boundaries	---
Tahsil Boundaries	Tahsil Boundaries	---
Block Boundaries	Block Boundaries	Block Boundaries
---	Panchayat Boundary	Panchayat Boundary
---	---	Village Boundaries
District Head Quarters	District Head Quarters	---
Tehsil Head Quarters	Tehsil Head Quarters	---
Block Head Quarters	Block Head Quarters	Block Head Quarters
Cities and Market Towns	Cities and Market Towns	Cities and Market Towns
---	---	Village Settlements
Forest Management Boundaries	Forest Management Boundaries	Forest Management Boundaries
Road / Rail Network	Road / Rail Network	Road / Rail Network

6.2.NON-SPATIAL DATABASE DESIGN AND ORGANIZATION:

- Identification and collection of non-spatial data elements consisting of
    - District census Handbook Data of all districts of Uttaranchal State
    - Census-data of 1991 and 2001
    - Data containing information about amenities/ facilities available in each of the village of Narendra Nagar Block (Tehri Garhwal District).
    - Data related to Distance wise availability of facilities in each village of Narendra Nagar Block.
- Editing the non-spatial data attributes.
- Transformation of all data obtained in a suitable standard digital form i.e. dbase files such that it is compatible.
- Design and Organization
    - All the non-spatial data obtained from different sources are organized following a State-District-Block-Village hierarchy using MS-Excel software.

A summary list of the data elements is given in table 5.2.

Table 5.2: Elements of non-spatial database.

State Level	District Level	Block Level
Total Area	Total Area	Total Area
Land-use/ cover Data	Land-use / cover Data	Land-use / cover Data
Forest Land Data	Forest Land Data	Forest Land Data
Agriculture Land Data	Agriculture Land Data	Agriculture Land Data
Irrigated Land Data	Irrigated Land Data	Irrigated Land Data
District Population	Block Population	Village Population
---	---	No. of Households
SC/ ST Population	SC/ ST Population	SC/ ST Population
Sex-Ratio	Sex-Ratio	Sex-Ratio
Literacy rate	Literacy rate	Literacy rate
Districts	District	
Tehsils	No. of Tehsils	---
Blocks	Blocks	Block
No. of Nyaya Panchayats	Nyaya Panchayats	Nyaya Panchayats

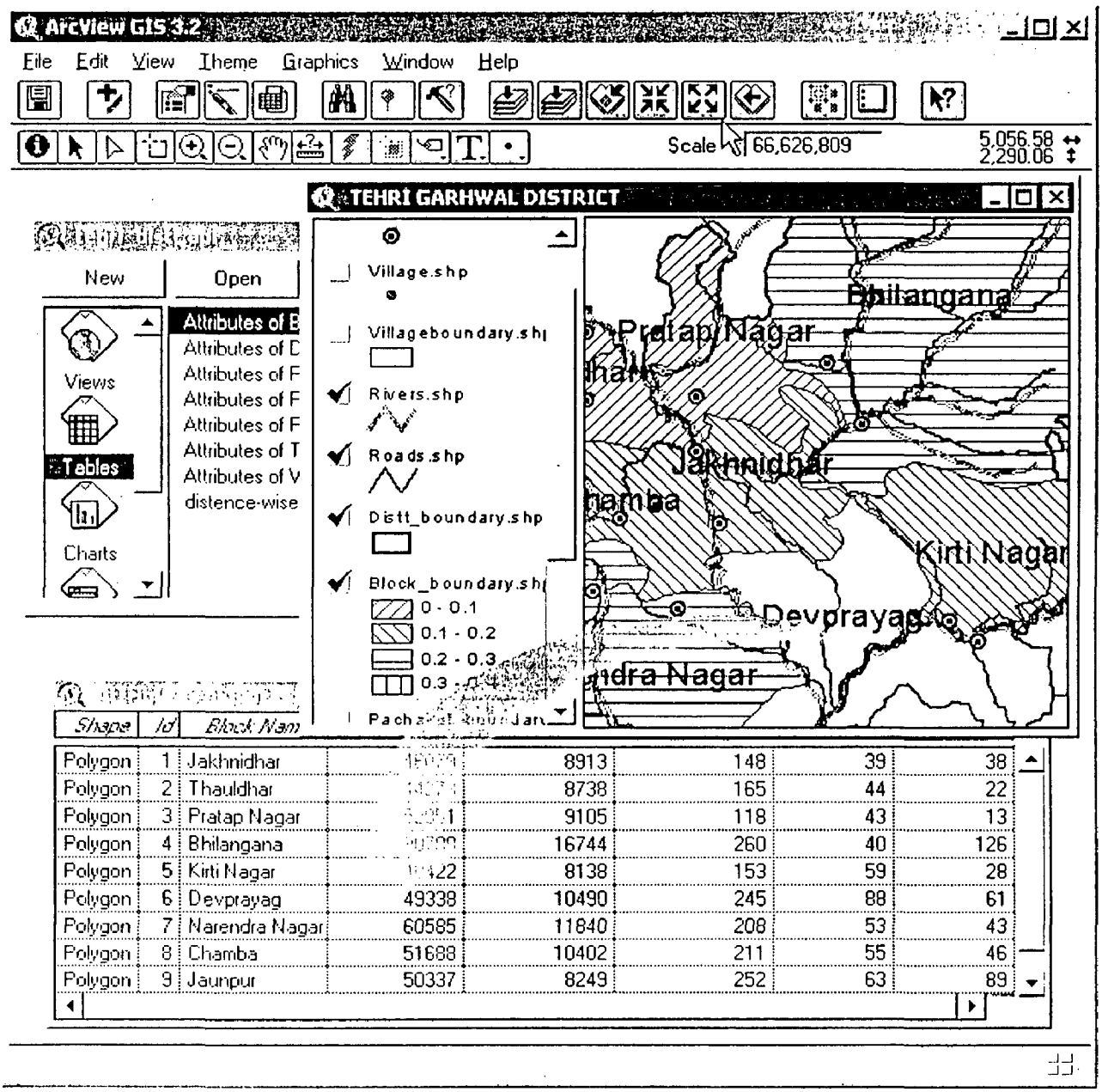
No. of Gram Panchayats	No. of Gram Panchayats	Gram Panchayats
No. of Villages	No. of Villages	Villages
No. of Cities/ Market Towns	No. of Cities/ Market Towns	No. of Cities/ Market Towns
No. of Nagar Nigam	No. of Nagar Nigam	---
No. of Municipal Boards	No. of Municipal Boards	No. of Municipal Boards
No. of Nagar Panchayats	No. of Nagar Panchayats	No. of Nagar Panchayats
Cantt. Area	Cantt. Area	Cantt. Area
---	Rural Police Stations	Rural Police Stations
---	Urban Police Stations	Urban Police Stations
---	Rural Post Offices	Rural Post Offices
---	Urban Post Offices	Urban Post Offices
---	No. of Banks	Banks
---	No. of Ration Shops	Ration Shops
---	No. of Agriculture Service Centers	Agriculture Service Centers
---	No. of Veterinary Hospitals	Veterinary Hospitals
---	Health Centers	Health Centers
---	No. of Public Telephones	Public Telephones
---	No. of Primary Schools	Primary Schools
---	No. of Electrified Villages	Electrified Villages
---	No. of Electrified Towns	Electrified Towns
---	No. of Water Supplied Villages	Water Supplied Villages
---	Water Supplied Towns	Water Supplied Towns
---	No. of Villages connected to Metalled Road	Villages connected to Metalled Road
---	No. of Altitude Of villages	Altitude Of villages
---	No. of Orientation of Villages	Orientation of Villages
---	No. of Main Workers	Main Workers
---	No. of Marginal Workers	Marginal Workers
---	No. of Non-workers	Non-workers

6.3.LINKAGE OF SPATIAL AND NON-SPATIAL DATA:

GIS allows the linkage of spatial and non-spatial data based upon a defined relationship. A one to one relationship can be defined for each of the spatial entity with the non-spatial data (See figure 6.1). For performing the linkage operation the following steps were done:

- Identification of relation between spatial and non-spatial data such as one-to-one relationship between each of the village entity with non-spatial data for them.
- Selection of key field as linkage item which may be Census-code, polygon – id obtained after topology creation in Arc/Info or self-generated code.
- Linkage has been done in Arc View 3.2a environment of the Arc/Info coverages, as they are easily accessible through ArcVeiw by performing Join operation.

Figure 6.1: Linked spatial and non-spatial data.



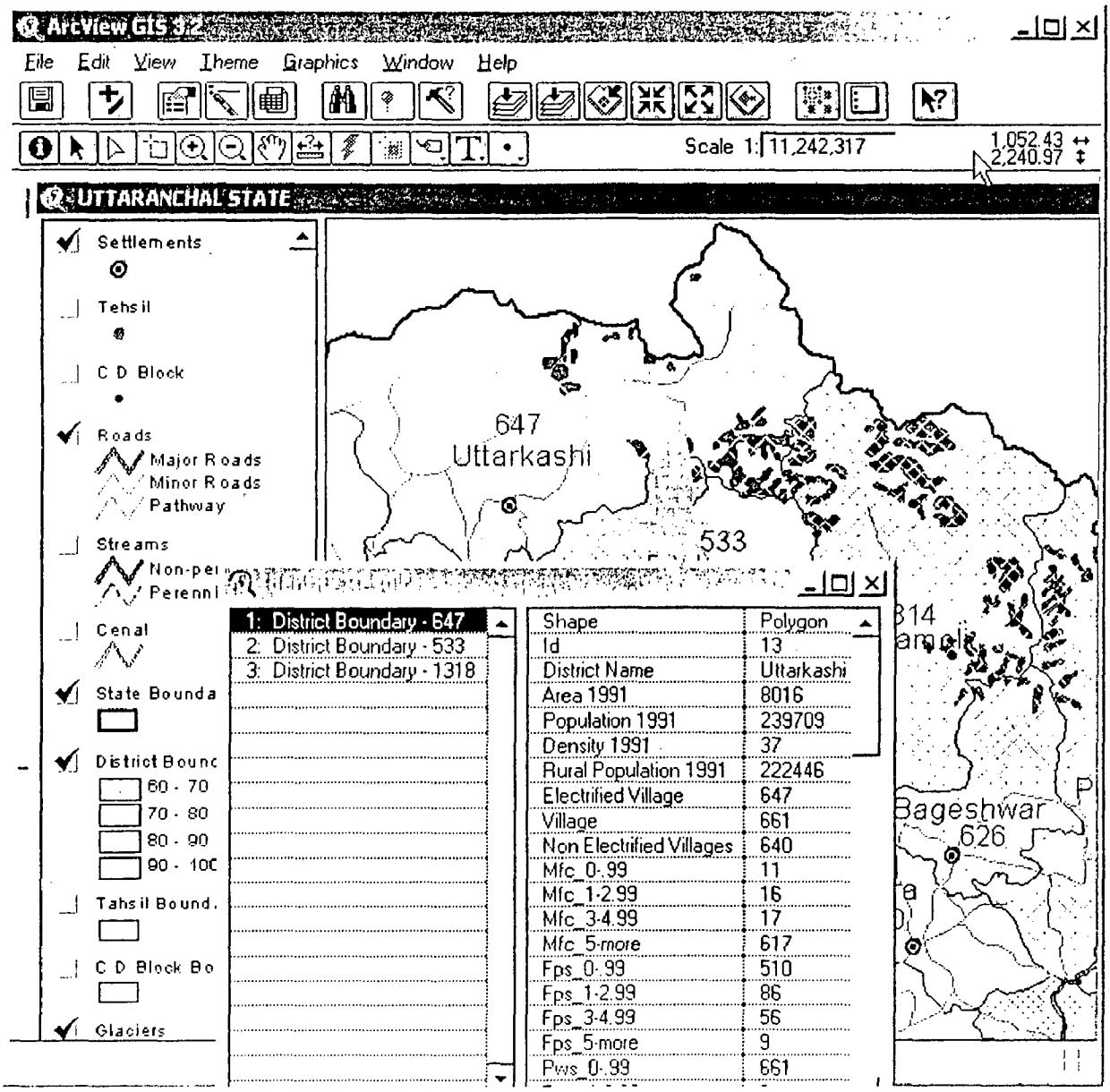
6.4. METHOD OF ANALYSIS:

In a GIS based system any analysis can be done and its output can be shown in a much better way only by integrating non-spatial data with spatial data. The core of all analysis is:

- A combination of different parameter whether spatial or non-spatial.
- Derivation of mathematical indices from non-spatial data and representing them spatially.

6.5. QUERY: GIS enables the user to generate queries from spatial database by clicking on particular feature and display its results as shown in figure 6.2.

Figure 6.2: Use of GIS database in querying.



Chapter 7

GIS APPLICATION TO RURAL PLANNING AT MACRO LEVEL

The stress on developmental planning is that it should be able to project regional and local physio-geographical endowments and the social characteristics of the people involved, and thus bring out the total perspective of the region. This calls for an integrated plan involving the assessment of the existing levels of physical, economic and social resources of the region and their spatial distribution, and then estimating needs of the various resources in the region based on the resource potential and the existing pattern.

In present study, main emphasis is to derive such indices which reflect the level of infrastructural development of each District, Block and village and identify each of these spatially. To fulfill this objective, data (spatial and non-spatial) is collected at three levels i.e. State, District and Block level and organized separately.

7.1. STATE LEVEL DATABASE ANALYSIS:

For integrated development of a state, all the districts of the state should have developmental opportunities in equal proportion. To achieve this goal, a comparative analysis of the districts is done in GIS environment. According to various levels of human needs, data is categorized in three groups:

Primary needs	Secondary needs	Tertiary needs
Major facilities centre	Fair price shops	Seed/ Fertilizer/ Pesticides Centre
Water supply	Access roads	Veterinary Hospital
Medical/ Health	Post office	Agriculture Loan Society
Basic Education	Telephone	Bank
Electricity/ Power	Market	Artificial Breeding Centre

7.1.1. PRIMARY NEEDS:

For integrated development of a community, social and physical infrastructure is the basic need of a society that includes water, health, education, electricity. These primary needs are classified as major facility centres. An overall assessment of all these facilities can help in determining the least developed, less developed and developed villages of a district. As shown in map 6, in Uttarkashi, Rudraprayag, Dehradun, Tehri and Pauri, 90 to 95 % villages do not have major facility centers within 5 km.

Figure 7.1: District-wise Distance of Major Facility Centres from problematic villages.

Attributes of Dist_Boundary.shp

Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Village	(3 - 4.99 Km.)	(>5 Km.)
Polygon	6	Haridwar	1124488	612	776346	489	62	369
Polygon	7	Nainital	582729	196	391740	1062	81	887
Polygon	12	Udhamsinghnaga	914569	424	622276	656	75	513
Polygon	5	Dehradun	1025679	414	510199	727	29	665
Polygon	13	Uttarkashi	239709	37	222446	661	17	617
Polygon	10	Rudraprayag	200515	98	198672	654	11	613
Polygon	11	Tehri Garhwal	520214	155	487319	1760	64	1652
Polygon	3	Chamoli	325247	49	286550	1134	63	989
Polygon	8	Pauri garhwal	671541	133	590359	3113	117	2830
Polygon	9	Pithoragarh	416647	65	380950	1560	119	1372
Polygon	4	Champawat	192637	112	166539	643	35	575
Polygon	1	Almora	608210	171	560475	2147	137	1851
Polygon	2	Bagheshwar	228407	147	222635	860	38	748

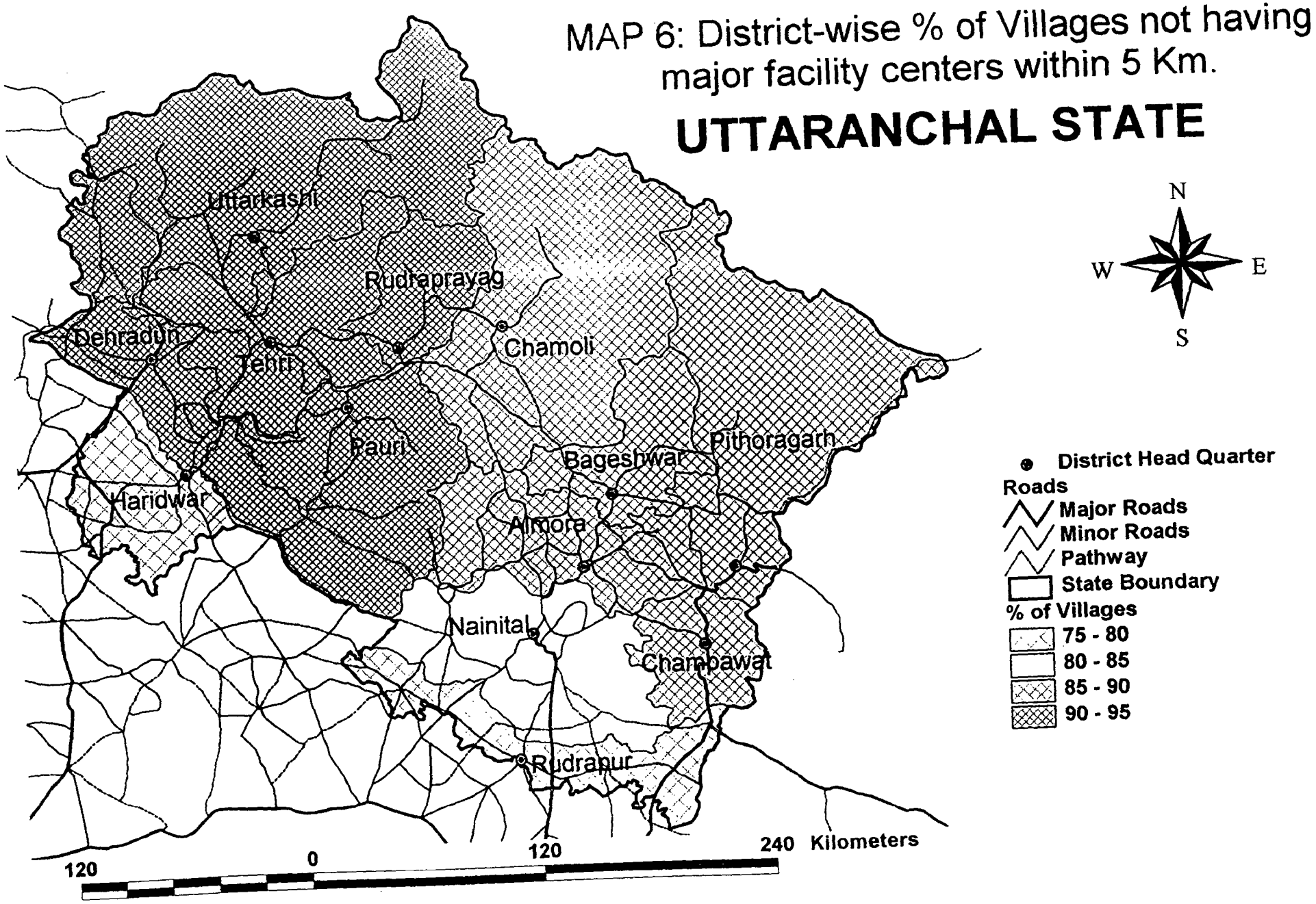
7.1.1.1. WATER:

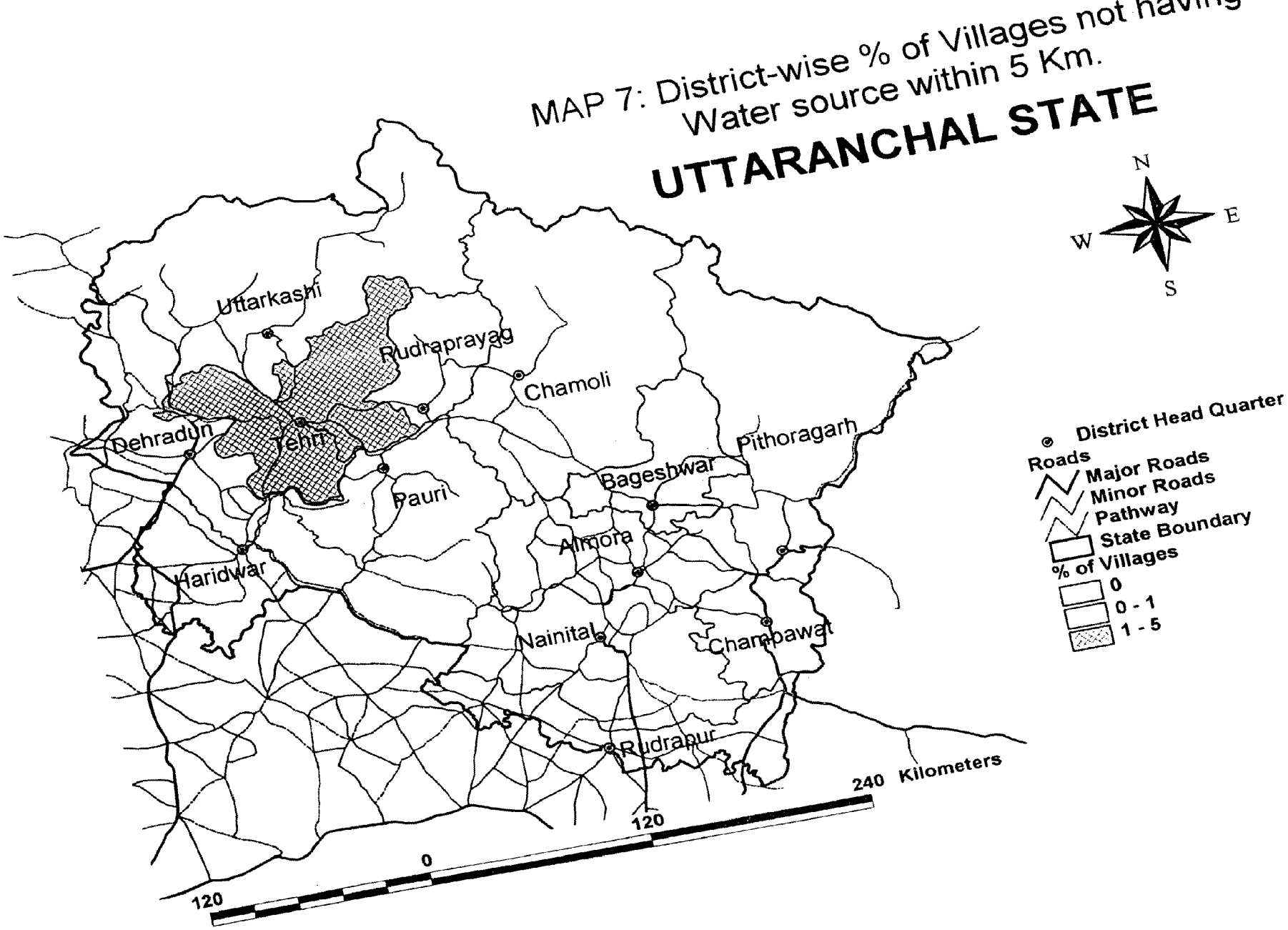
Water is a most basic human need and in absence of it no one can survive. As shown map 7, in Tehri and Bagerhwar district, villages do not have water source availability within 5 km.

Figure7.2: District-wise Distance of Potable Water Source from problematic villages

Attributes of Dist_Boundary.shp

Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Village	(3 - 4.99 Km.)	(>5 Km.)
Polygon	6	Haridwar	1124488	612	776346	489	0	0
Polygon	7	Nainital	582729	196	391740	1062	0	0
Polygon	12	Udhamsinghnaga	914569	424	622276	656	0	0
Polygon	5	Dehradun	1025679	414	510199	727	0	0
Polygon	13	Uttarkashi	239709	37	222446	661	0	0
Polygon	10	Rudraprayag	200515	98	198672	654	0	0
Polygon	11	Tehri Garhwal	520214	155	487319	1760	47	8
Polygon	3	Chamoli	325247	49	286550	1134	0	0
Polygon	8	Pauri garhwal	671541	133	590359	3113	39	0
Polygon	9	Pithoragarh	416647	65	380950	1560	0	0
Polygon	4	Champawat	192637	112	166539	643	0	0
Polygon	1	Almora	608210	171	560475	2147	6	0
Polygon	2	Bagheshwar	228407	147	222635	860	6	1


MAP 6: District-wise % of Villages not having major facility centers within 5 Km.
UTTARANCHAL STATE
N
W
E
S
Uttarkashi
Rudraprayag
Chamoli
Dehradun
Tehri
Pauri
Pithoragarh
Bageshwar
Haridwar
Almora
Nainital
Champawat
Rudrapur
District Head Quarter
Roads
Major Roads
Minor Roads
Pathway
State Boundary
% of Villages
75 - 80
80 - 85
85 - 90
90 - 95
120
0
120
240 Kilometers


MAP 7: District-wise % of Villages not having Water source within 5 Km.
UTTARANCHAL STATE
N
W
E
S
Uttarkashi
Rudraprayag
Chamoli
Tehri
Dehradun
Pauri
Pithoragarh
Bageshwar
Almora
Haridwar
Nainital
Champawat
Rudrapur
District Head Quarter
Roads
Major Roads
Minor Roads
Pathway
State Boundary
% of Villages
0
0 - 1
1 - 5
120
0
120
240 Kilometers

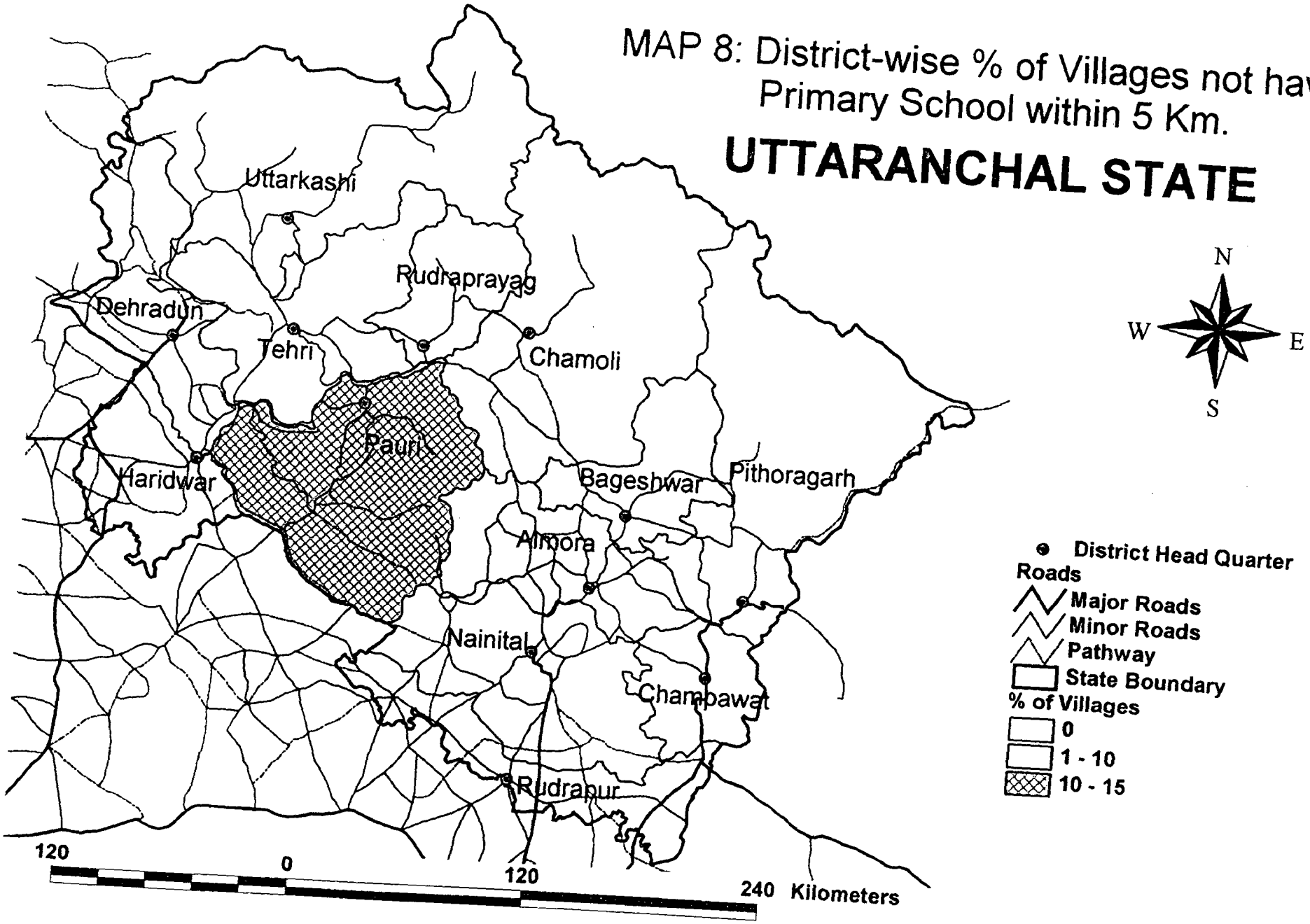
7.1.1.2. EDUCATION:

The level of social development of a village/ settlement mainly depends on education facility available. In Uttaranchal State, villages of Uttarkashi and Nainital district have basic education facility within 5 km. In Pauri district 12 % villages do not have primary school within 5 km. range as shown in map 8.

Figure7.3: Distances wise Villages having Junior Basic School

Attributes of Distt_Boundary.shp

Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Village	(3 - 4.99 Km.)	(>5 Km.)
Polygon	6	Haridwar	1124488	612	776346	489	13	5
Polygon	7	Nainital	582729	196	391740	1062	0	0
Polygon	12	Udhamsinghnaga	914569	424	622276	656	16	5
Polygon	5	Dehradun	1025679	414	510199	727	24	12
Polygon	13	Uttarkashi	239709	37	222446	661	1	0
Polygon	10	Rudraprayag	200515	98	198672	654	2	3
Polygon	11	Tehri Garhwal	520214	155	487319	1760	70	22
Polygon	3	Chamoli	325247	49	286550	1134	10	5
Polygon	8	Pauri garhwal	671541	133	590359	3113	335	456
Polygon	9	Pithoragarh	416647	65	380950	1560	48	21
Polygon	4	Champawat	192637	112	166539	643	49	4
Polygon	1	Almora	608210	171	560475	2147	398	24
Polygon	2	Bagheshwar	228407	147	222635	860	29	21


MAP 8: District-wise % of Villages not having Primary School within 5 Km.
UTTARANCHAL STATE
N
W
E
S
Uttarkashi
Rudraprayag
Dehradun
Tehri
Chamoli
Pauri
Haridwar
Bageshwar
Pithoragarh
Almora
Nainital
Champawat
Rudrapur
District Head Quarter
Roads
Major Roads
Minor Roads
Pathway
State Boundary
% of Villages
0
1 - 10
10 - 15
120
0
120
240 Kilometers

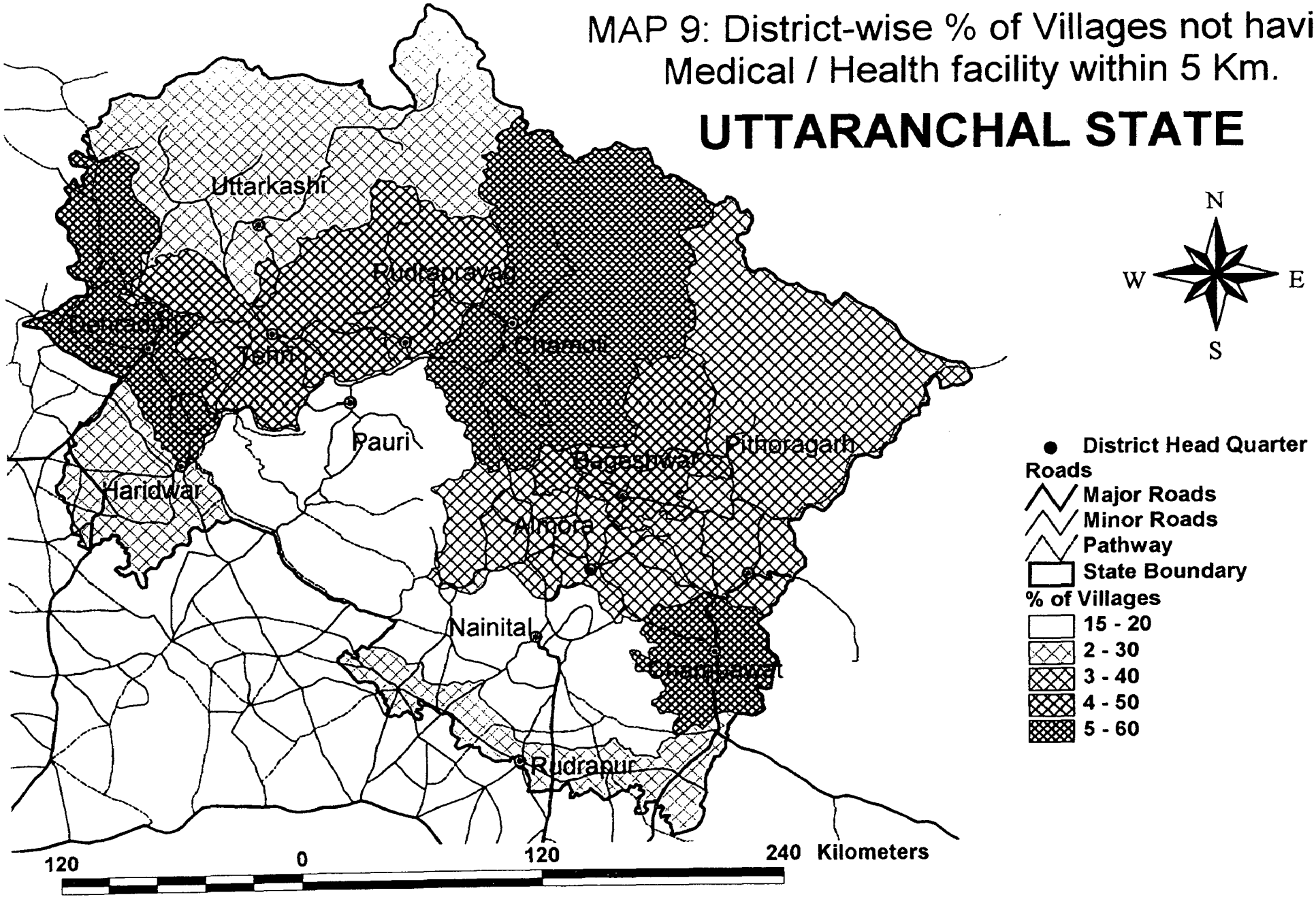
7.1.1.3. HEALTH FACILITIES:

Basic (primary) health facilities for physical health of the population are an essential need of the community. As shown in map 9, 50 to 60 % Villages of Dehradun, Chamoli and Champawat districts do not have medical facility within 5 km range. For villages of Tehri, Rudraprayag and Bageshwar district it is 40 to 50 %.

Figure7.4: District-wise Distance of Primary Health Centre/ Hospital from problematic villages

Attributes of Dist_boundary.shp

Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Villages	(3-4.99 Km)	(>5 Km)
Polygon	6	Haridwar	1124488	612	776346	489	126	113
Polygon	7	Nainital	582729	196	391740	1062	296	175
Polygon	12	Udhamsinghnaga	914569	424	622276	656	175	193
Polygon	5	Dehradun	1025679	414	510199	727	64	398
Polygon	13	Uttarkashi	239709	37	222446	661	133	175
Polygon	10	Rudraprayag	200515	98	198672	654	101	292
Polygon	11	Tehri Garhwal	520214	155	487319	1760	398	847
Polygon	3	Chamoli	325247	49	286550	1134	71	635
Polygon	8	Pauri garhwal	671541	133	590359	3113	0	609
Polygon	9	Pithoragarh	416647	65	380950	1560	392	563
Polygon	4	Champawat	192637	112	166539	643	112	359
Polygon	1	Almora	608210	171	560475	2147	531	722
Polygon	2	Bagheshwar	228407	147	222635	860	57	413


MAP 9: District-wise % of Villages not having Medical / Health facility within 5 Km.
UTTARANCHAL STATE
N
W
E
S
Uttarkashi
Rudraprayag
Chamoli
Tehri
Pauri
Pithoragarh
Haridwar
Almora
Nainital
Rudrapur
District Head Quarter
Roads
Major Roads
Minor Roads
Pathway
State Boundary
% of Villages
15 - 20
2 - 30
3 - 40
4 - 50
5 - 60
120
0
120
240 Kilometers

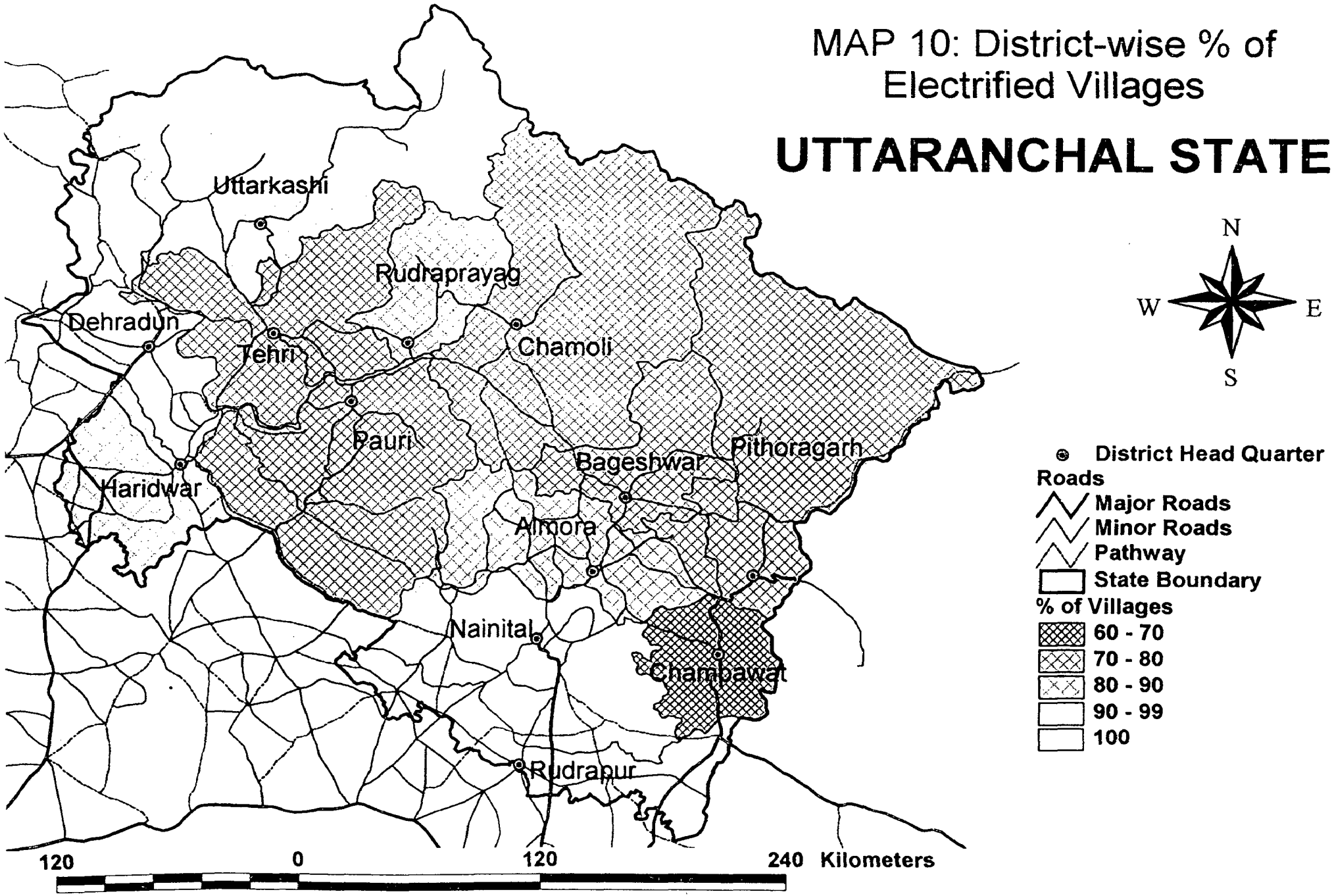
7.1.1.4. ELECTRICITY:

More than 60 % of the total villages of the Champawat district are not electrified while in Dehradun and udham Singh Nagar 100 % villages are electrified as shown in map 10.

Figure 7.5: Distances wise Villages not having electricity

Attributes of Distt_boundary.shp

Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Village	Non Electrified Villages
Polygon	6	Haridwar	1124488	612	776346	489	454
Polygon	7	Nainital	582729	196	391740	1062	1009
Polygon	12	Udhamsinghnaga	914569	424	622276	656	656
Polygon	5	Dehradun	1025679	414	510199	727	727
Polygon	13	Uttarkashi	239709	37	222446	661	640
Polygon	10	Rudraprayag	200515	98	198672	654	538
Polygon	11	Tehri Garhwal	520214	155	487319	1760	1387
Polygon	3	Chamoli	325247	49	286550	1134	831
Polygon	8	Pauri garhwal	671541	133	590359	3113	2241
Polygon	9	Pithoragarh	416647	65	380950	1560	1197
Polygon	4	Champawat	192637	112	166539	643	411
Polygon	1	Almora	608210	171	560475	2147	1744
Polygon	2	Bagheshwar	228407	147	222635	860	648


MAP 10: District-wise % of Electrified Villages
UTTARANCHAL STATE
N
W
E
S
Uttarkashi
Rudraprayag
Dehradun
Tehri
Chamoli
Pauri
Pithoragarh
Bageshwar
Haridwar
Almora
Nainital
Champawat
Rudrapur
District Head Quarter
Roads
Major Roads
Minor Roads
Pathway
State Boundary
% of Villages
60 - 70
70 - 80
80 - 90
90 - 99
100
120
0
120
240 Kilometers

7.1.2. SECONDARY NEEDS:

7.1.2.1. ACCESS ROAD:

Due to hilly terrain most of the villages in Uttaranchal State are located far away from the vehicular roads. In Bageshwar district more than 50 % of the villages are situated more than 5 km away from the metalled road. (See map 11)

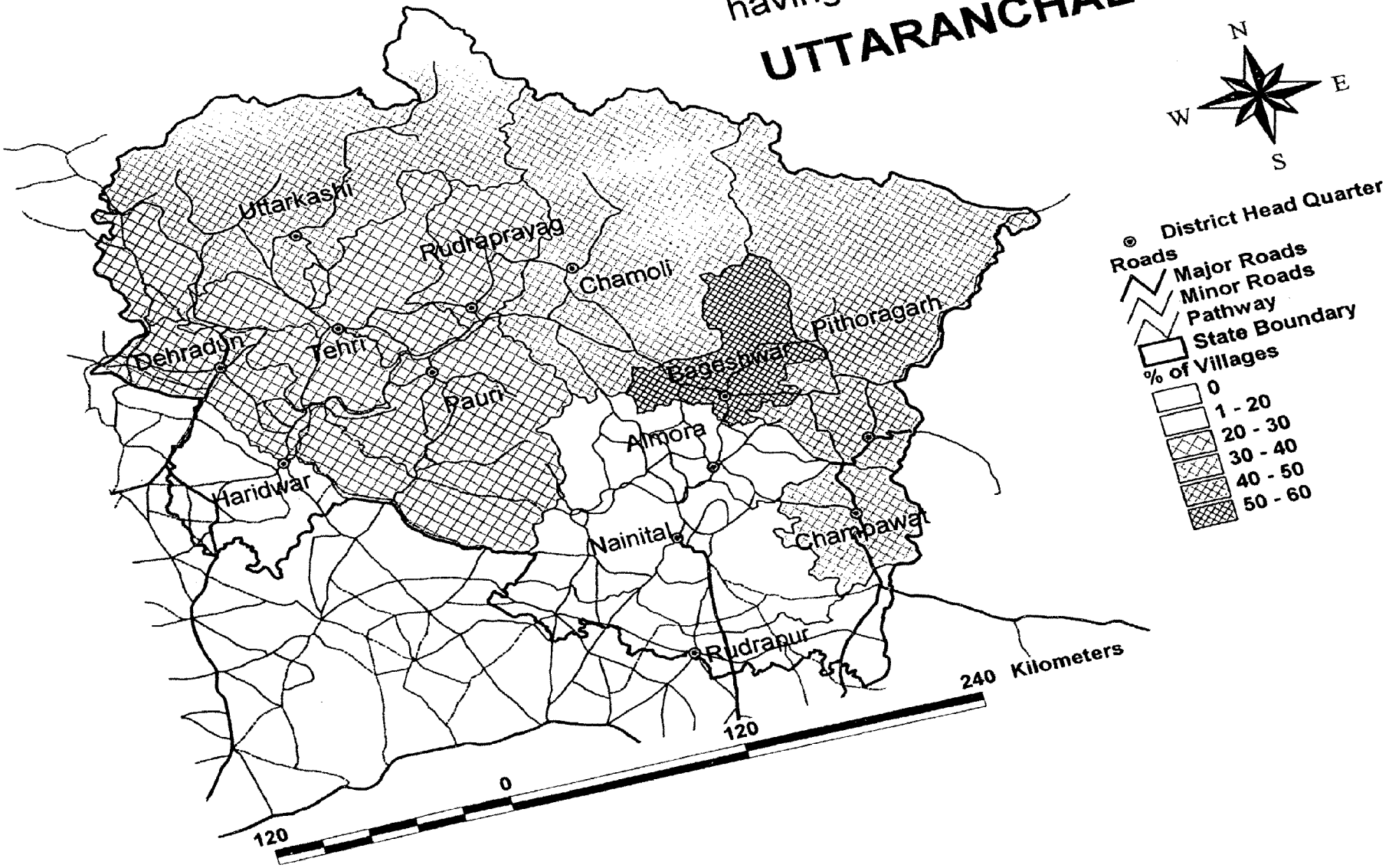
Figure7.6: Distances wise Villages having Metalled Road

Attributes of Distt_boundary.shp

Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Villages	3/4.99 Km	5 Km	A
Polygon	6	Haridwar	1124488	612	776346	489	15	6	
Polygon	7	Nainital	582729	196	391740	1062	20	0	
Polygon	12	Udhamsinghnaga	914569	424	622276	656	8	3	
Polygon	5	Dehradun	1025679	414	510199	727	65	215	
Polygon	13	Uttarkashi	239709	37	222446	661	98	207	
Polygon	10	Rudraprayag	200515	98	198672	654	72	141	
Polygon	11	Tehri Garhwal	520214	155	487319	1760	383	492	
Polygon	3	Chamoli	325247	49	286550	1134	126	439	
Polygon	8	Pauri garhwal	671541	133	590359	3113	197	789	
Polygon	9	Pithoragarh	416647	65	380950	1560	222	489	
Polygon	4	Champawat	192637	112	166539	643	102	202	
Polygon	1	Almora	608210	171	560475	2147	378	394	
Polygon	2	Bagheshwar	228407	147	222635	860	45	502	

MAP 11: District-wise % of Villages not having Metalled road within 5 Km

UTTARANCHAL STATE



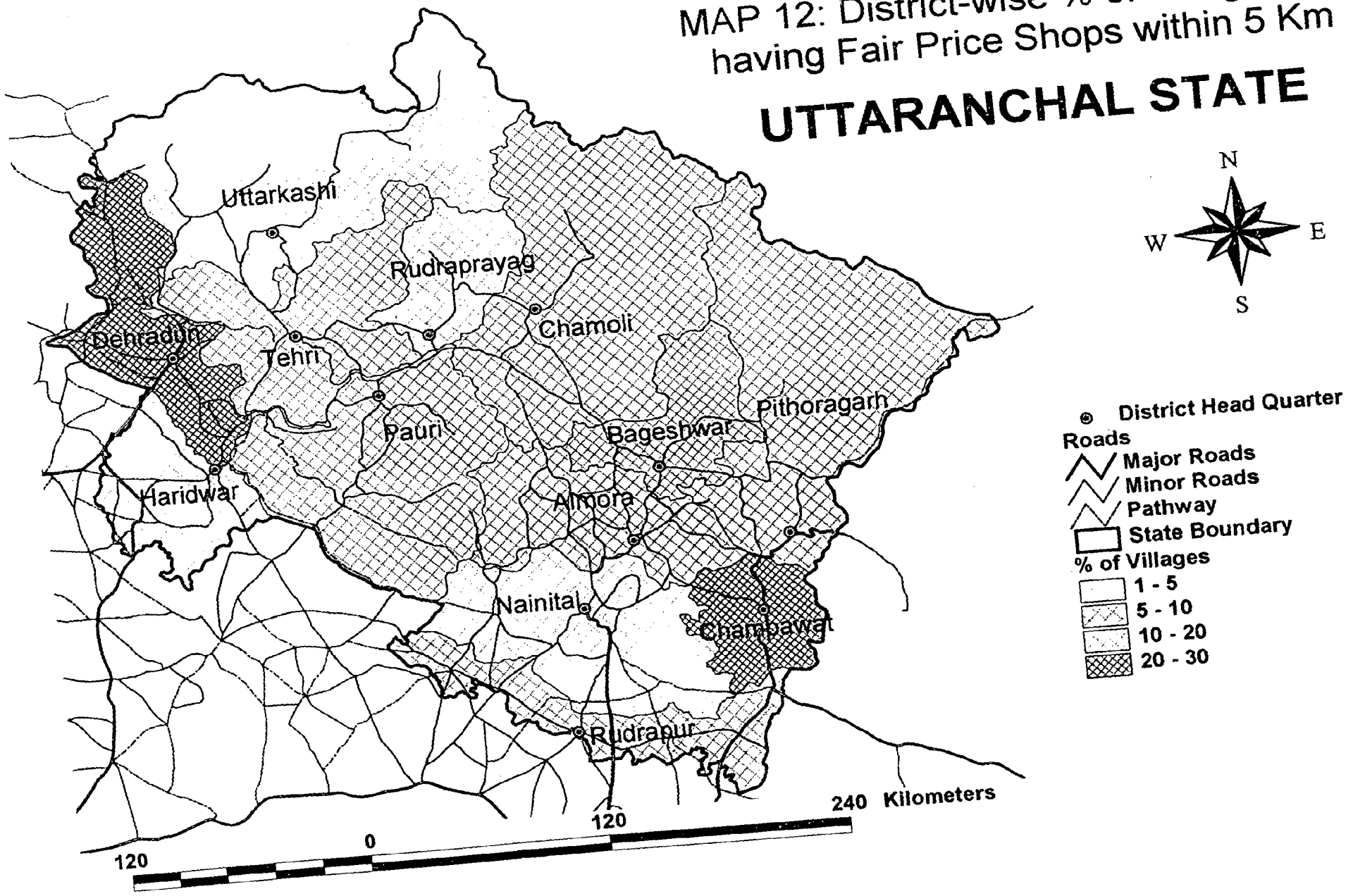
7.1.2.2. FAIR PRICE SHOPS:

Fair price shops (ration shops) for rural people are very much required to fulfill daily basic needs. More than 20 % of the village sof Dehradun and Champawat district do not have this facility within 5 km range and for Bageshwar district it is 13 % .

Figure7.7: Distances wise Villages having Fair Price Shops

Attributes of Distt Boundary.shp

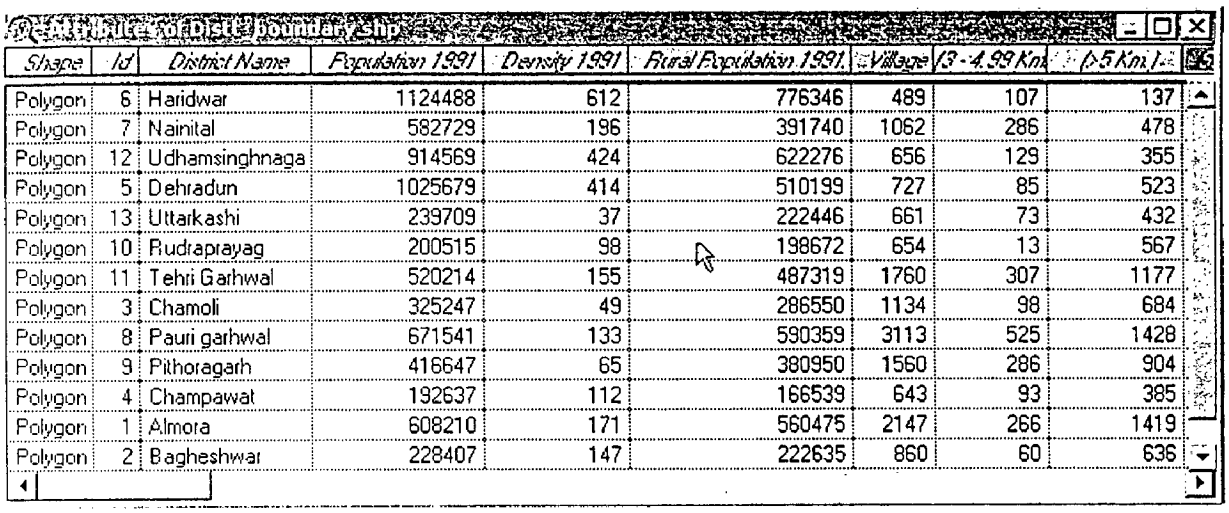
Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Villages	(3 - 4.99 Km	(>5 Km)
Polygon	6	Haridwar	1124488	612	776346	489	20	6
Polygon	7	Nainital	582729	196	391740	1062	117	42
Polygon	12	Udhamsinghnaga	914569	424	622276	656	62	62
Polygon	5	Dehradun	1025679	414	510199	727	57	210
Polygon	13	Uttarkashi	239709	37	222446	661	56	9
Polygon	10	Rudraprayag	200515	98	198672	654	40	24
Polygon	11	Tehri Garhwal	520214	155	487319	1760	245	142
Polygon	3	Chamoli	325247	49	286550	1134	65	62
Polygon	8	Pauri garhwal	671541	133	590359	3113	482	253
Polygon	9	Pithoragarh	416647	65	380950	1560	167	123
Polygon	4	Champawat	192637	112	166539	643	87	135
Polygon	1	Almora	808210	171	560475	2147	370	185
Polygon	2	Bagheshwar	228407	147	222635	860	72	90


MAP 12: District-wise % of Villages not having Fair Price Shops within 5 Km
UTTARANCHAL STATE
N
W
E
S
Uttarkashi
Rudraprayag
Chamoli
Dehradun
Tehri
Pauri
Pithoragarh
Bageshwar
Haridwar
Almora
Nainital
Champawat
Rudrapur
District Head Quarter
Roads
Major Roads
Minor Roads
Pathway
State Boundary
% of Villages
1 - 5
5 - 10
10 - 20
20 - 30
120
0
120
240 Kilometers

7.1.2.3. LOCAL MARKET:

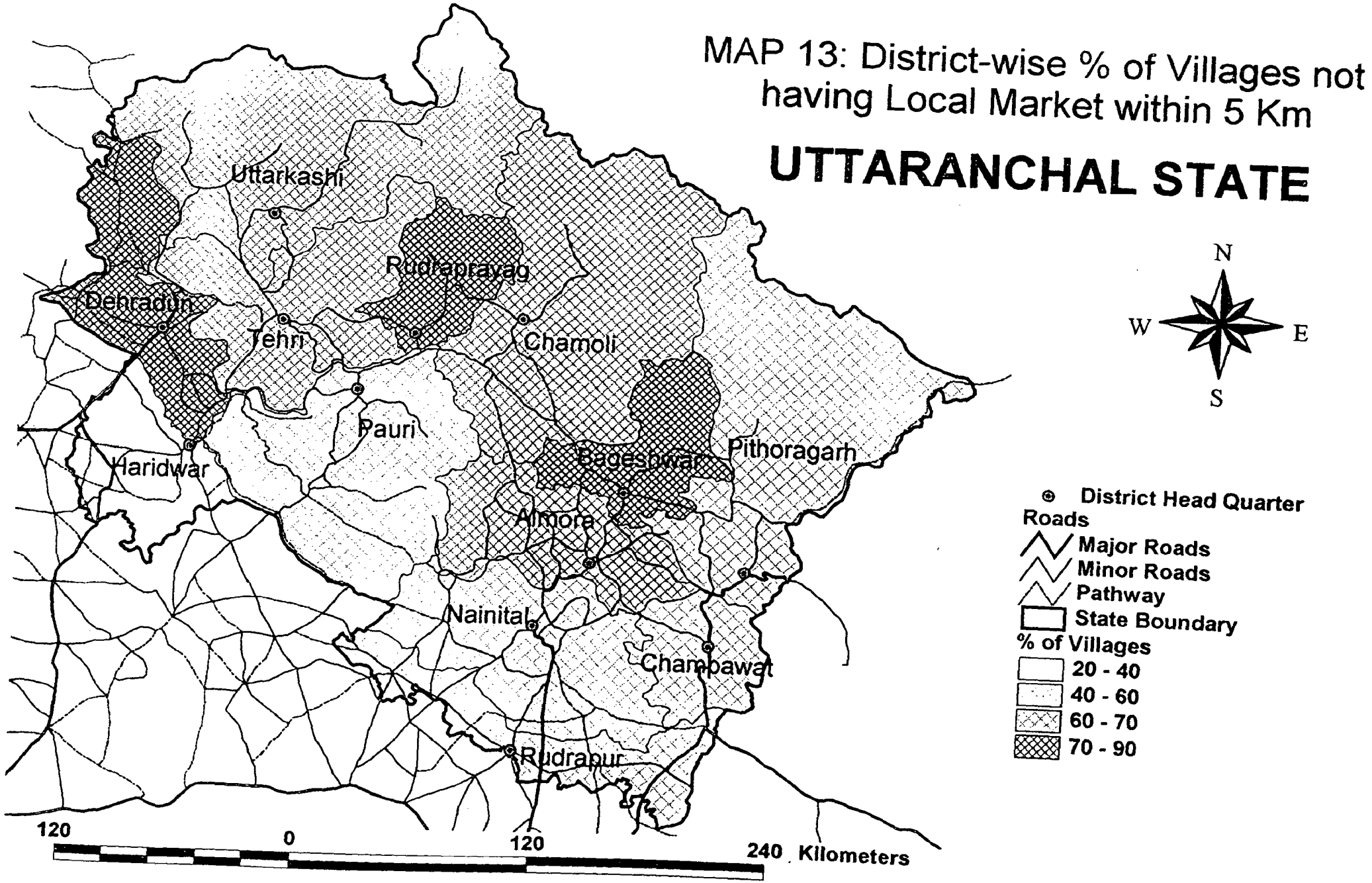
In all the districts, Most of the villages do not have local market within reachable distance. In Dehradun, Rudraprayag and Bageshwar district, 70 to 90 % of the villages do not have local market within 5 km range as shown in map 13.

Figure7.8: Distances wise Villages having Local Market



Attributes of Dist_Boundary.shp

Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Village	(3 - 4.99 Km)	(>5 Km)
Polygon	6	Haridwar	1124488	612	776346	489	107	137
Polygon	7	Nainital	582729	196	391740	1062	286	478
Polygon	12	Udhamsinghnaga	914569	424	622276	656	129	355
Polygon	5	Dehradun	1025679	414	510199	727	85	523
Polygon	13	Uttarkashi	239709	37	222446	661	73	432
Polygon	10	Rudraprayag	200515	98	198672	654	13	567
Polygon	11	Tehri Garhwal	520214	155	487319	1760	307	1177
Polygon	3	Chamoli	325247	49	286550	1134	98	684
Polygon	8	Pauri garhwal	671541	133	590359	3113	525	1428
Polygon	9	Pithoragarh	416647	65	380950	1560	286	904
Polygon	4	Champawat	192637	112	166539	643	93	385
Polygon	1	Almora	608210	171	560475	2147	266	1419
Polygon	2	Bagheshwar	228407	147	222635	860	60	636

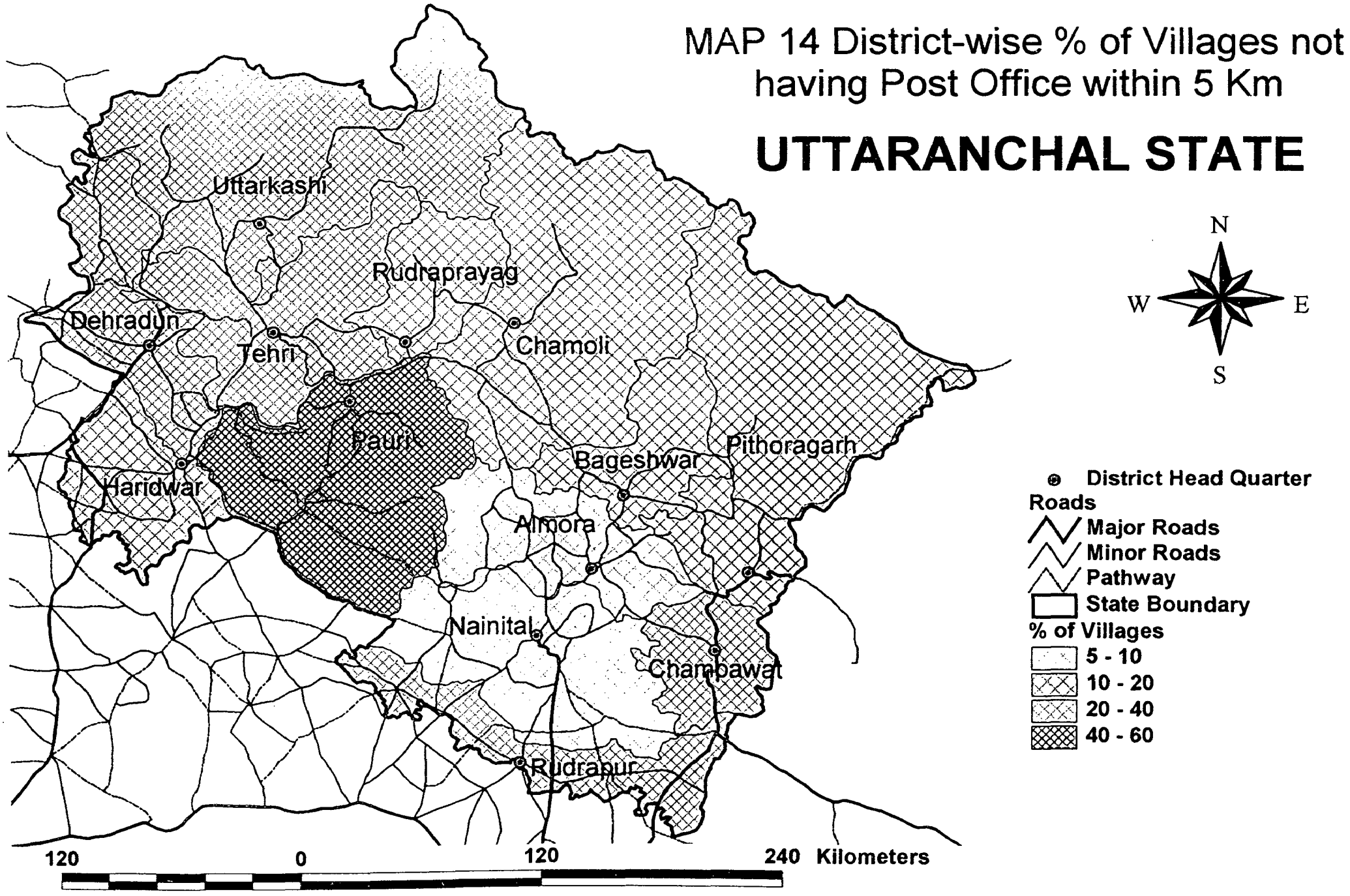

MAP 13: District-wise % of Villages not having Local Market within 5 Km
UTTARANCHAL STATE
N
W
E
S
Uttarkashi
Rudraprayag
Dehradun
Tehri
Chamoli
Pauri
Haridwar
Pithoragarh
Bageshwar
Almora
Nainital
Champawat
Rudrapur
District Head Quarter
Roads
Major Roads
Minor Roads
Pathway
State Boundary
% of Villages
20 - 40
40 - 60
60 - 70
70 - 90
120
0
120
240 Kilometers

7.1.2.4. POST OFFICE:

In rural areas, primary source of communication is post office. 55 % of the villages of pauri district do not have post office facility within 5 km distance. As shown in map 14, 20 to 40 % villages in Uttarkashi, Tehri, Dehradun, Champawat and Udham Singh Nagar are more than 5 km far away fro post office facility.

Figure7.9: Distances wise Villages having Post Office

Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Villages	(3 - 4.99 Km.)	(>5 Km.)
Polygon	6	Haridwar	1124488	612	776346	489	123	97
Polygon	7	Nainital	582729	196	391740	1062	263	103
Polygon	12	Udhamsinghnaga	914569	424	622276	656	158	187
Polygon	5	Dehradun	1025679	414	510199	727	103	282
Polygon	13	Uttarkashi	239709	37	222446	661	117	177
Polygon	10	Rudraprayag	200515	98	198672	654	84	129
Polygon	11	Tehri Garhwal	520214	155	487319	1760	487	443
Polygon	3	Chamoli	325247	49	286550	1134	141	203
Polygon	8	Pauri garhwal	671541	133	590359	3113	188	1779
Polygon	9	Pithoragarh	416647	65	380950	1560	246	161
Polygon	4	Champawat	192637	112	166539	643	120	196
Polygon	1	Almora	608210	171	560475	2147	398	154
Polygon	2	Bagheshwar	228407	147	222635	860	82	157


MAP 14 District-wise % of Villages not having Post Office within 5 Km
UTTARANCHAL STATE
N
W
E
S
Uttarkashi
Rudraprayag
Dehradun
Tehri
Chamoli
Pauri
Pithoragarh
Bageshwar
Haridwar
Almora
Nainital
Champawat
Rudrapur
District Head Quarter
Roads
Major Roads
Minor Roads
Pathway
State Boundary
% of Villages
5 - 10
10 - 20
20 - 40
40 - 60
120
0
120
240 Kilometers

7.1.2.5. TELEPHONE FACILITY:

Due to advancement in communication technology, Telephone facility made the communication system easy and cheap. This facility should be available to rural people.But in Uttaranchal State, in more than half of the districts, villages do not have telephone facility within 5 km distance. This % is very high (more than 70 %) in Uttarkashi and Bageshwar district.

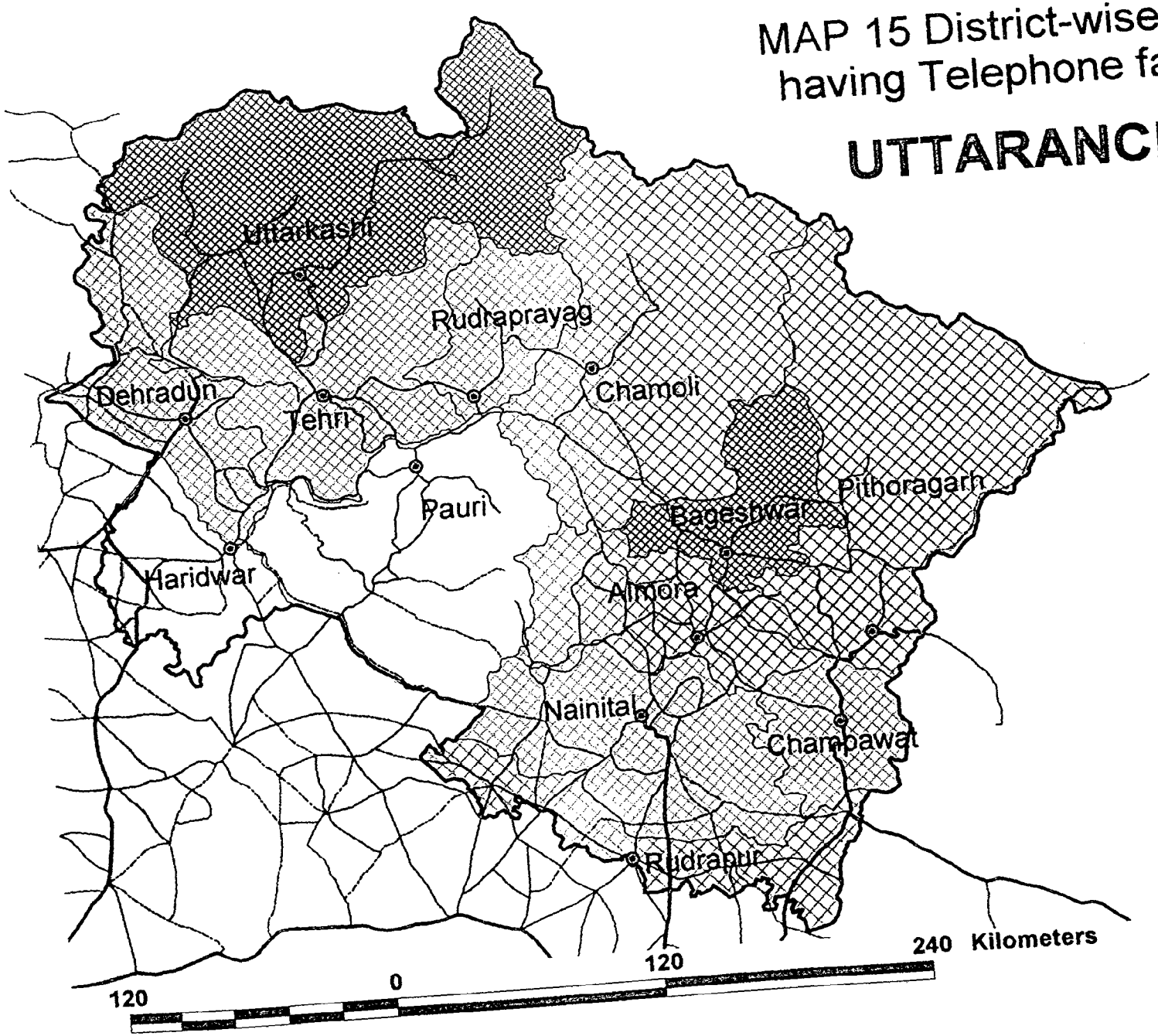
Figure 7.10: Distances wise Villages having Public Call Office (PCO)

Attributes of Distt_Boundary.shp

Shape	Id	District Name	Population 1991	Density 1991	Rural Population 1991	Village	(3-4.99 Km.)	(>5 Km.)
Polygon	6	Haridwar	1124488	612	776346	489	59	90
Polygon	7	Nainital	582729	196	391740	1062	127	603
Polygon	12	Udhamsinghnaga	914569	424	622276	656	120	293
Polygon	5	Dehradun	1025679	414	510199	727	58	460
Polygon	13	Uttarkashi	239709	37	222446	661	24	589
Polygon	10	Rudraprayag	200515	98	198672	654	56	377
Polygon	11	Tehri Garhwal	520214	155	487319	1760	263	1105
Polygon	3	Chamoli	325247	49	286550	1134	109	486
Polygon	8	Pauri garhwal	671541	133	590359	3113	488	684
Polygon	9	Pithoragarh	416647	65	380950	1560	304	633
Polygon	4	Champawat	192637	112	166539	643	63	379
Polygon	1	Almora	608210	171	560475	2147	389	936
Polygon	2	Bagheshwar	228407	147	222635	860	37	681

MAP 15 District-wise % of Villages not having Telephone facility within 5 Km

UTTARANCHAL STATE



N
W E
S

District Head Quarter

Roads
- Major Roads
- Minor Roads
- Pathway
- State Boundary

% of Villages
- 15 - 30
- 30 - 50
- 50 - 70
- 70 - 90

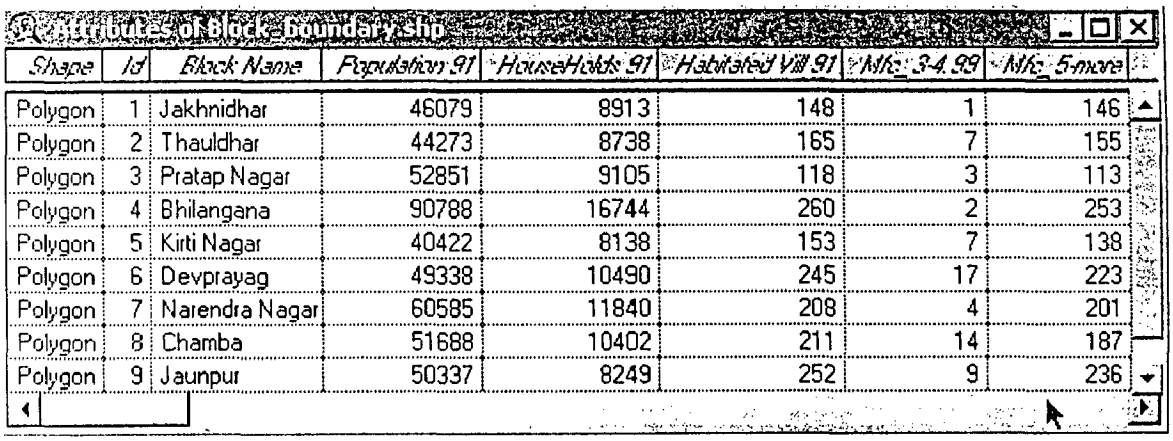
7.2. DISTRICT DATABASE ANALYSIS:

Similarly for district level analysis of Tehri Garhwal District, data is categorized into three parts i.e. Primary, Secondary and Tertiary needs.

7.2.1. PRIMARY NEEDS:

Major facility center represente the overall assement of primary facilities, which includes, water supply, electricity facility, basic education and health facility. Villages of Bhilangana, Pratap Nagar, jakhnidhar and Narendra Nagar lack in terms of major facility center as they do not have this facility within 5 km range.

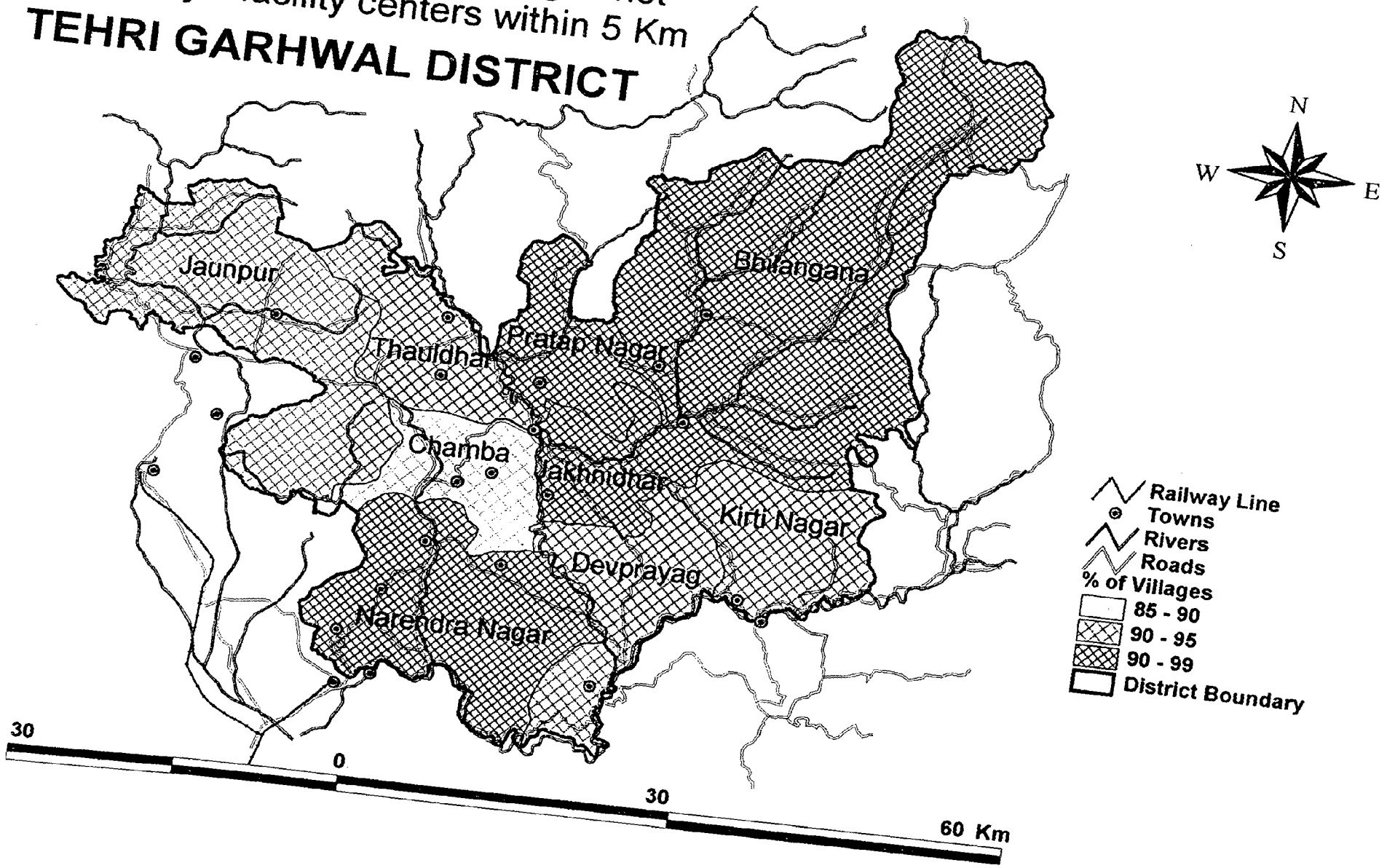
Figure7.11: Major Facility Centre


Attributes of Block_boundary.shp

Shape	Id	Block Name	Population 91	HouseHolds 91	Habitated Vill 91	Mfc_3-4.99	Mfc_5-more
Polygon	1	Jakhnidhar	46079	8913	148	1	146
Polygon	2	Thauldhar	44273	8738	165	7	155
Polygon	3	Pratap Nagar	52851	9105	118	3	113
Polygon	4	Bhilangana	90788	16744	260	2	253
Polygon	5	Kirti Nagar	40422	8138	153	7	138
Polygon	6	Devprayag	49338	10490	245	17	223
Polygon	7	Narendra Nagar	60585	11840	208	4	201
Polygon	8	Chamba	51688	10402	211	14	187
Polygon	9	Jaunpur	50337	8249	252	9	236

MAP 16: Block-wise % of Villages not having Major facility centers within 5 Km

TEHRI GARHWAL DISTRICT



7.2.1.1. WATER:

Water being the basic human need for survival, its availability is crucial. Majority of blocks have water supply source. Only few villages of jaunpur and Chamba blocks do not have this facility as shown in map 17.

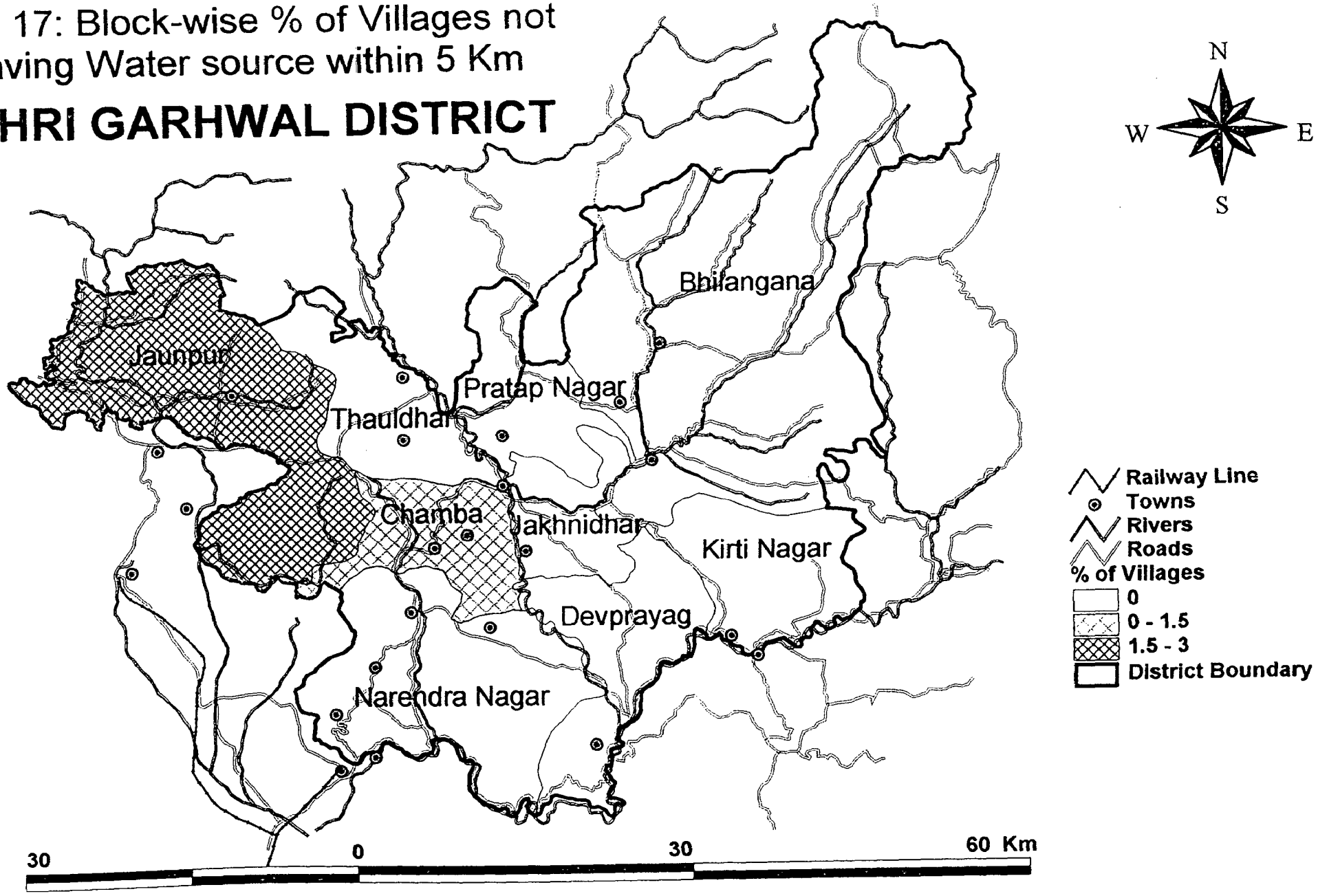
Figure 7.12: Potable Water Source

Attributes of Block_boundary2.shp

Shape	Id	Block Name	Population 91	HouseHolds 91	Habitated Vill 91	Fwc_3-4.99	Fwc_5-more
Polygon	1	Jakhnidhar	46079	8913	148	0	0
Polygon	2	Thauldhar	44273	8738	165	1	0
Polygon	3	Pratap Nagar	52851	9105	118	0	0
Polygon	4	Bhilangana	90788	16744	260	0	0
Polygon	5	Kirti Nagar	40422	8138	153	5	0
Polygon	6	Devprayag	49338	10490	245	0	0
Polygon	7	Narendra Nagar	60585	11840	208	3	0
Polygon	8	Chamba	51688	10402	211	2	1
Polygon	9	Jaunpur	50337	8249	252	36	7

MAP 17: Block-wise % of Villages not having Water source within 5 Km

TEHRI GARHWAL DISTRICT



7.2.1.2. EDUCATION:

The level of social development of a village/ settlement mainly depends on education facility available. Therefore, primary school must be in each village within reachable distance. Most of the villages through out the district have basic education facility within or near by the village. 4 % of the villages of Devprayag block are in lack of this facility within 5 km range as shown in map 18.

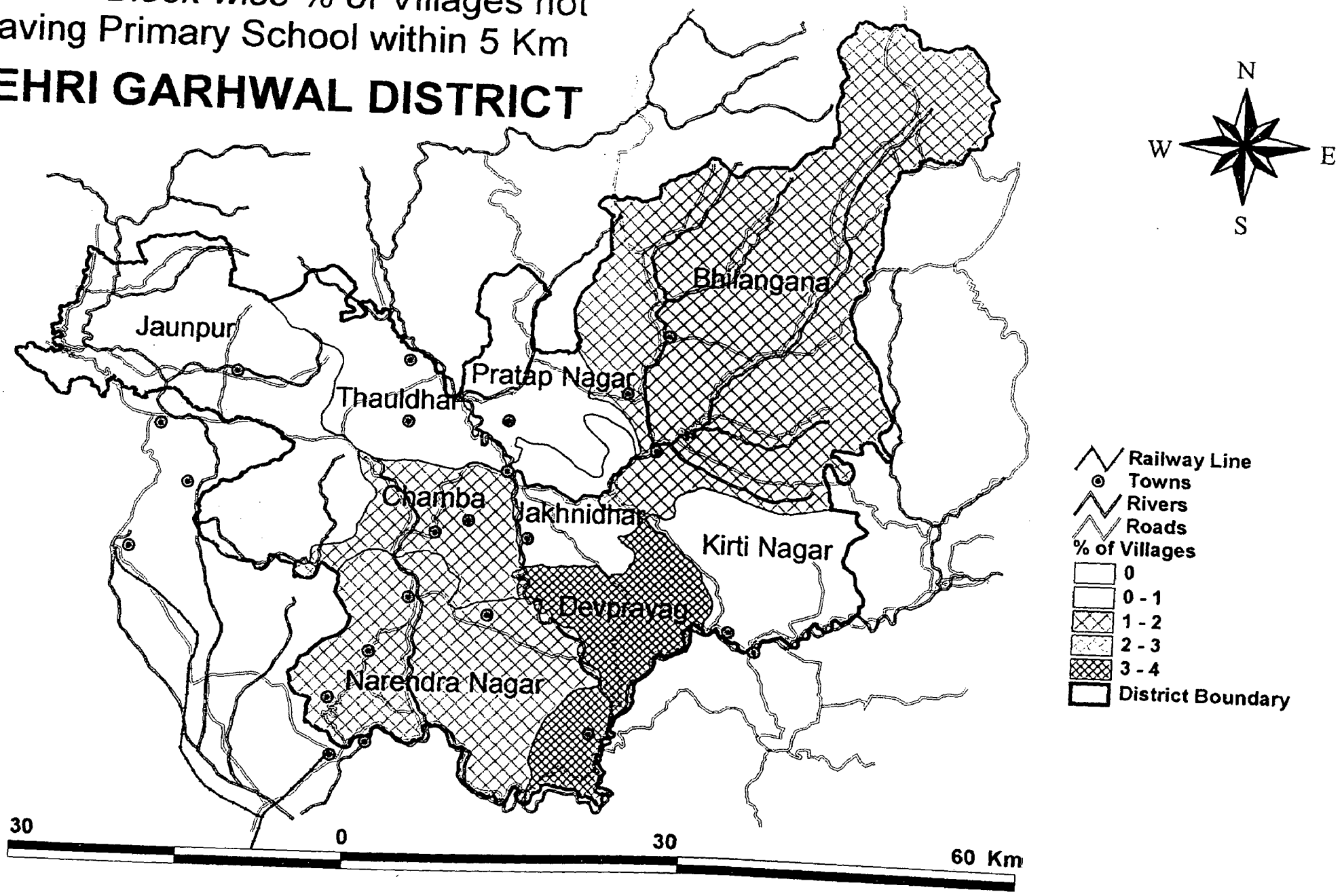
Figure 7.13: Junior Basic School

Attributes of Block_boundary.shp

Shape	Id	Block Name	Population 91	HouseHolds 91	Habitated Vill 91	Jhs_3-4.99	Jhs_5-more
Polygon	1	Jakhnidhar	46079	8913	148	7	0
Polygon	2	Thauldhar	44273	8738	165	4	0
Polygon	3	Pratap Nagar	52851	9105	118	1	1
Polygon	4	Bhilangana	90788	16744	260	6	4
Polygon	5	Kirti Nagar	40422	8138	153	7	0
Polygon	6	Devprayag	49338	10490	245	12	9
Polygon	7	Narendra Nagar	60585	11840	208	13	3
Polygon	8	Chamba	51688	10402	211	9	3
Polygon	9	Jaunpur	50337	8249	252	11	2

MAP 18: Block-wise % of Villages not having Primary School within 5 Km

TEHRI GARHWAL DISTRICT



7.2.1.3. HEALTH FACILITIES:

Due to hilly region and earth quake prone area, medical facility must be consider seriously as compare to plain. 66 % of villages of Jaunpur district do not have this facility within reachable distance as shown in map 19.

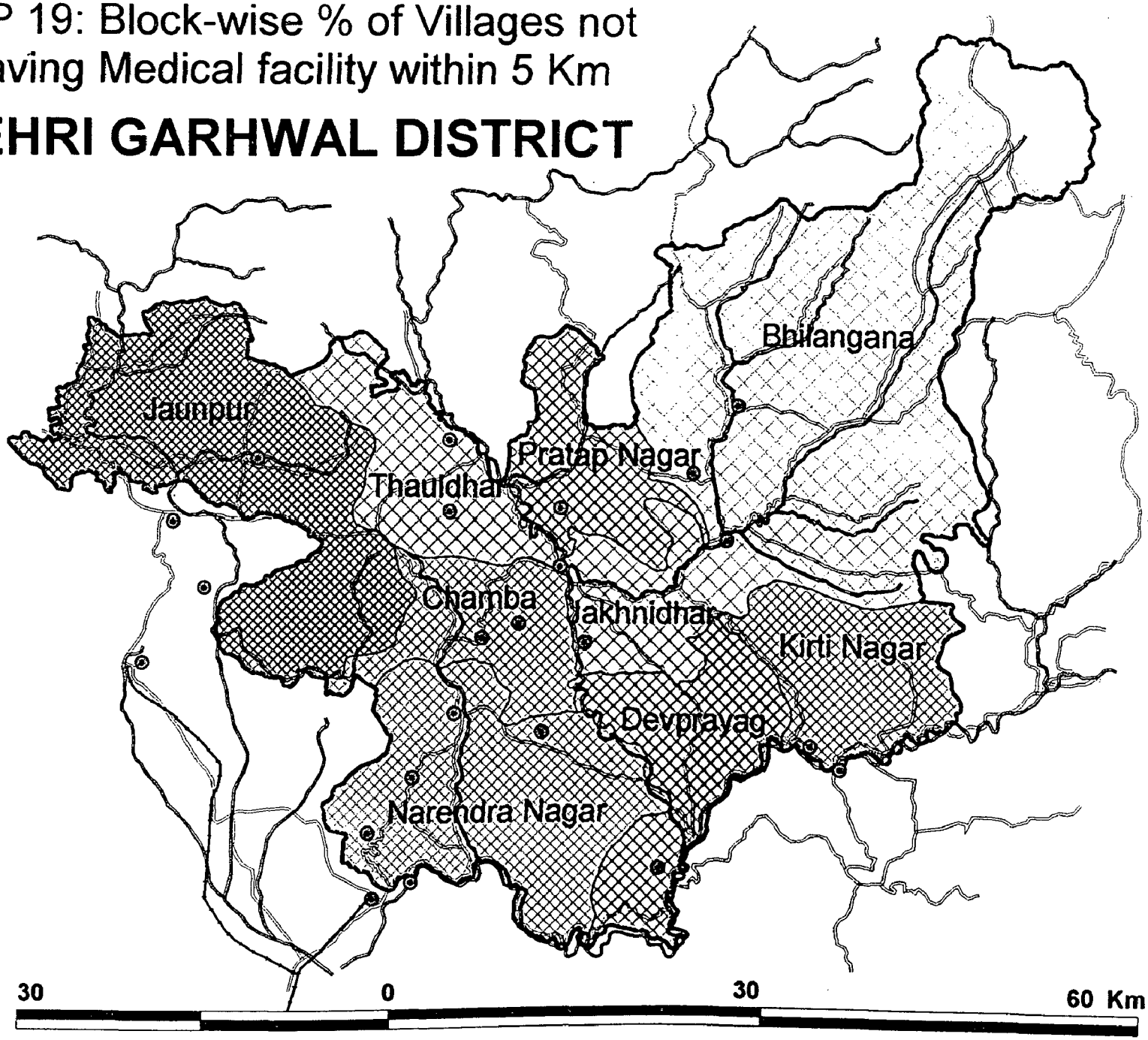
Figure 7.14: Primary Health Centre/ Hospital

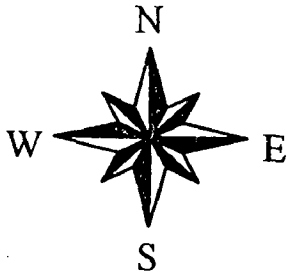
Attributes of Block_boundary.shp

Shape	Id	Block Name	Population 91	HouseHolds 91	Habitated Vill 91	Phc_3-4.99	Phc_5-more
Polygon	1	Jakhnidhar	46079	8913	148	41	59
Polygon	2	Thauldhar	44273	8738	165	40	50
Polygon	3	Pratap Nagar	52851	9105	118	17	55
Polygon	4	Bhilangana	90788	16744	260	73	77
Polygon	5	Kirti Nagar	40422	8138	153	24	88
Polygon	6	Devprayag	49338	10490	245	75	121
Polygon	7	Narendra Nagar	60585	11840	208	53	108
Polygon	8	Chamba	51688	10402	211	44	114
Polygon	9	Jaunpur	50337	8249	252	31	175

MAP 19: Block-wise % of Villages not having Medical facility within 5 Km

TEHRI GARHWAL DISTRICT





Railway Line
Towns
Rivers
Roads
% of Villages
25 - 30
30 - 40
40 - 50
50 - 60
60 - 70
District Boundary

7.2.1.4. ELECTRICITY:

In present, electricity has become an essential need for human being and it should be available in each village. In Devprayag block, 33 % villages do not have this facility within 5 km range.

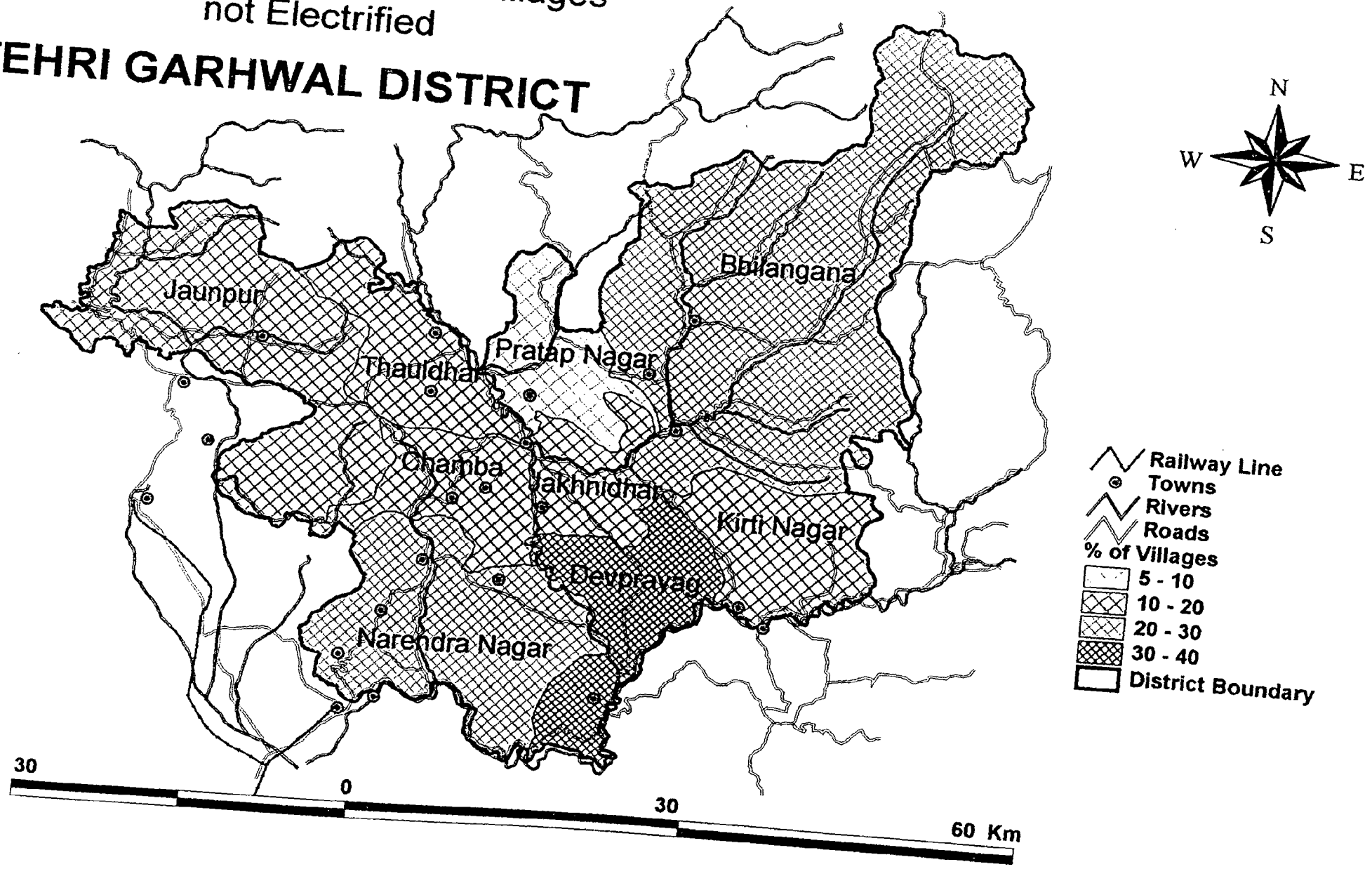
Figure 7.15: Not Electrified villages

Attributes of block boundary.shp

Shape	Id	Block Name	Population 91	Literacy 91	HouseHolds 91	Habitated Vill 91	Non Electrified
Polygon	1	Jakhnidhar	46079	1636	8913	148	28
Polygon	2	Thauldhar	44273	16993	8738	165	17
Polygon	3	Pratap Nagar	52851	18520	9105	118	11
Polygon	4	Bhilangana	90788	29523	16744	260	73
Polygon	5	Kirti Nagar	40422	18766	8138	153	27
Polygon	6	Devprayag	49338	18912	10490	245	88
Polygon	7	Narendra Nagar	60585	23194	11840	208	56
Polygon	8	Chamba	51688	23742	10402	211	37
Polygon	9	Jaunpur	50337	15518	8249	252	42

MAP 20: Block-wise % of Villages not Electrified

TEHRI GARHWAL DISTRICT



7.2.2. SECONRDARY NEEDS:

7.2.2.1. ACCESS ROAD:

The district has hilly terrain and has many villages located far away from the vehicular roads. As shown in map 21, more than 20 % of villages are located far away from metalled road. This % is 37 % in Devprayag block.

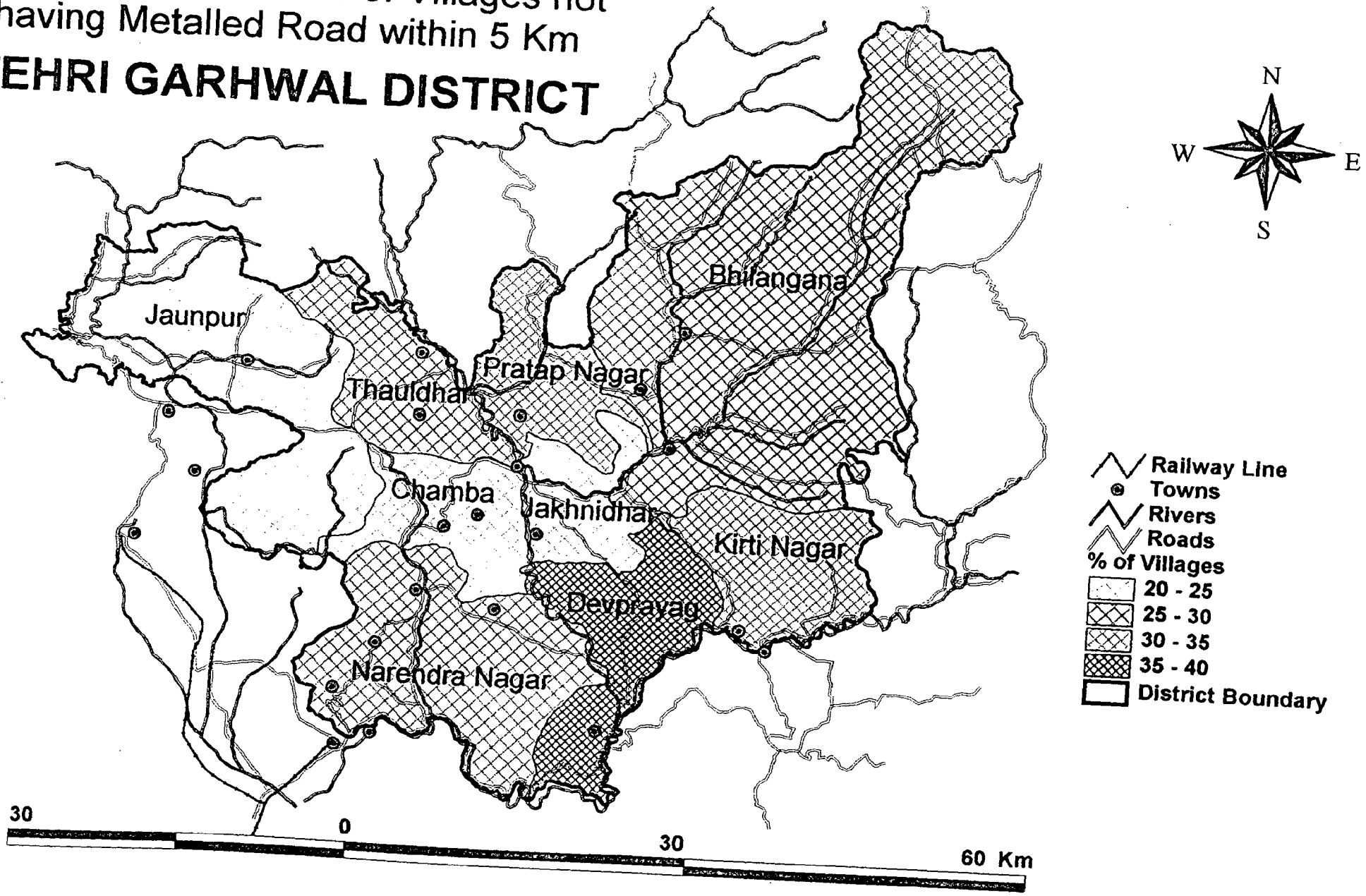
Figure 7.16: Metalled Road

Attributes of Block Boundary.shp

Shape	Id	Block Name	Population 91	HouseHolds 91	Habitated Vill 91	Nr_3-4.99	Nr_5-more
Polygon	1	Jakhnidhar	46079	8913	148	41	36
Polygon	2	Thauldhar	44273	8738	165	22	45
Polygon	3	Pratap Nagar	52851	9105	118	23	40
Polygon	4	Bhilangana	90788	16744	260	58	67
Polygon	5	Kirti Nagar	40422	8138	153	38	48
Polygon	6	Devprayag	49338	10490	245	57	98
Polygon	7	Narendra Nagar	60585	11840	208	44	57
Polygon	8	Chamba	51688	10402	211	47	45
Polygon	9	Jaunpur	50337	8249	252	53	56

MAP 21: Block-wise % of Villages not having Metalled Road within 5 Km

TEHRI GARHWAL DISTRICT



7.2.2.2. FAIR PRICE SHOPS:

In Devprayag block availability of fair price shops is less as compare to other blocks. 18 % of the villages of this block do not have this facility within 5 km range

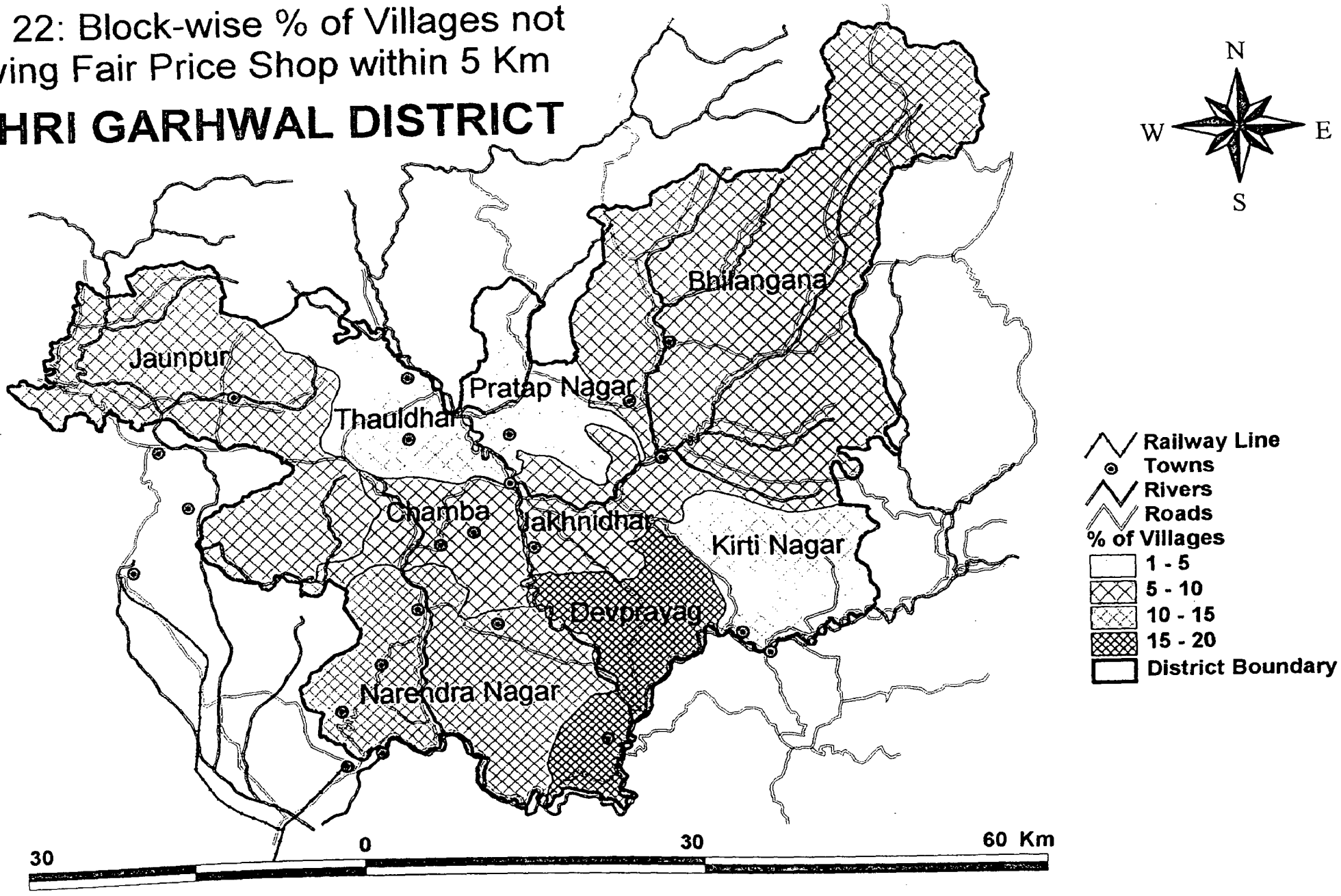
Figure 7.17: Fair Price Shops

Attributes of Block_boundary.shp

Shape	Id	Block Name	Population 91	HouseHolds 91	Habitated Vill 91	Fps_3-4.99	Fps_5-more
Polygon	1	Jakhnidhar	46079	8913	148	16	9
Polygon	2	Thauldhar	44273	8738	165	8	3
Polygon	3	Pratap Nagar	52851	9105	118	3	2
Polygon	4	Bhilangana	90788	16744	260	9	24
Polygon	5	Kirti Nagar	40422	8138	153	37	5
Polygon	6	Devprayag	49338	10490	245	59	42
Polygon	7	Narendra Nagar	60585	11840	208	41	27
Polygon	8	Chamba	51688	10402	211	44	12
Polygon	9	Jaunpur	50337	8249	252	28	18

MAP 22: Block-wise % of Villages not having Fair Price Shop within 5 Km

TEHRI GARHWAL DISTRICT



7.2.2.3. LOCAL MARKET:

Most of the villages in district do not have local market within reachable distance. In Chamba block, 84 % villages are located more than 5 km away from local market. And in thauldhar block 78 % villages do not have this facility within 5 km range as shown in map 23.

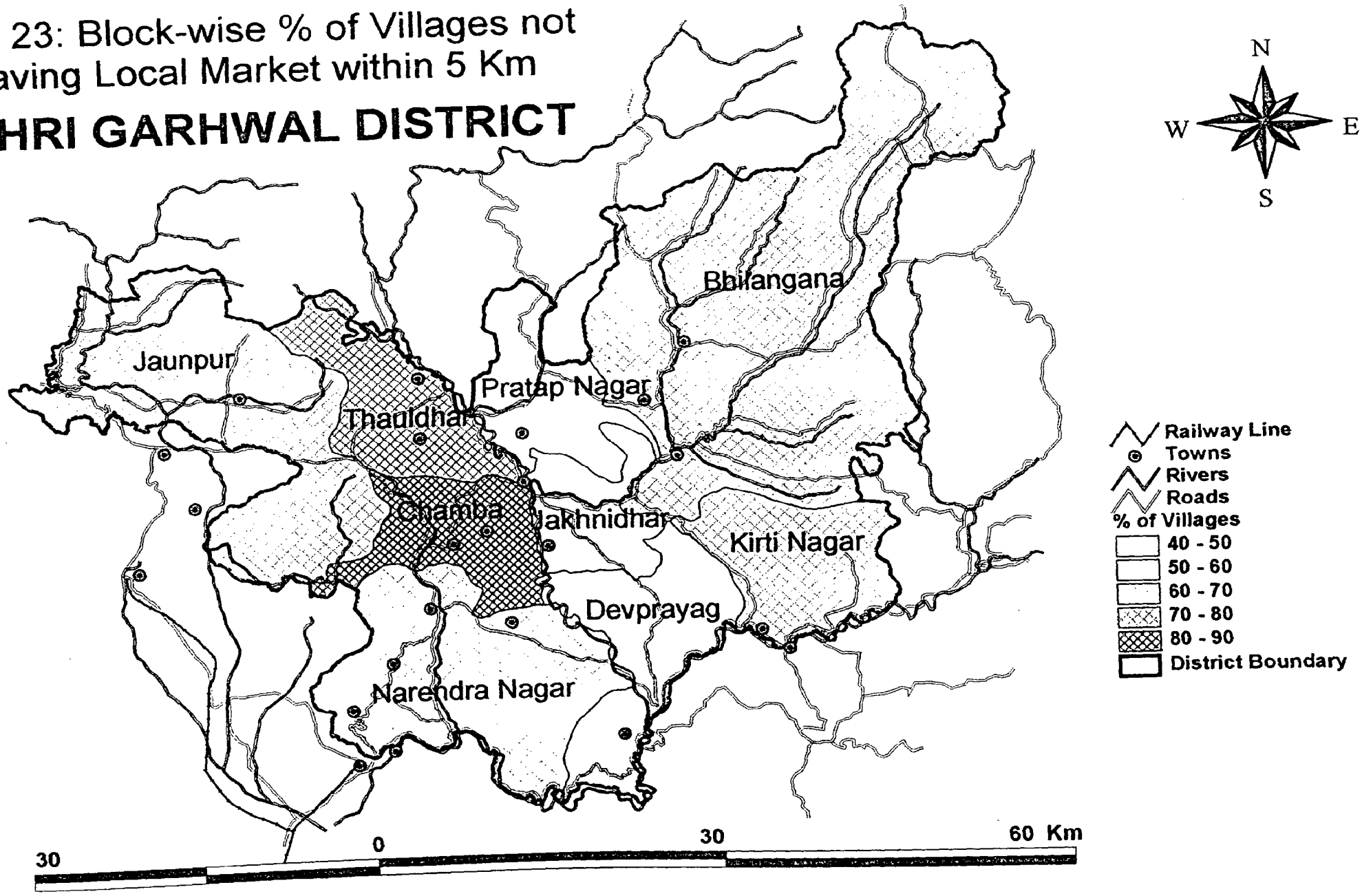
Figure 7.18: Local Market

Attributes of Block_boundary.shp

Shape	Id	Block_Name	Population_91	HouseHolds_91	Habitated Vill_91	Lm_3-4.99	Lm_5more
Polygon	1	Jakhnidhar	46079	8913	148	24	88
Polygon	2	Thauldhar	44273	8738	165	29	121
Polygon	3	Pratap Nagar	52851	9105	118	4	108
Polygon	4	Bhilangana	90788	16744	260	30	179
Polygon	5	Kirti Nagar	40422	8138	153	29	107
Polygon	6	Devprayag	49338	10490	245	66	141
Polygon	7	Narendra Nagar	60585	11840	208	60	89
Polygon	8	Chamba	51688	10402	211	23	176
Polygon	9	Jaunpur	50337	8249	252	42	168

MAP 23: Block-wise % of Villages not having Local Market within 5 Km

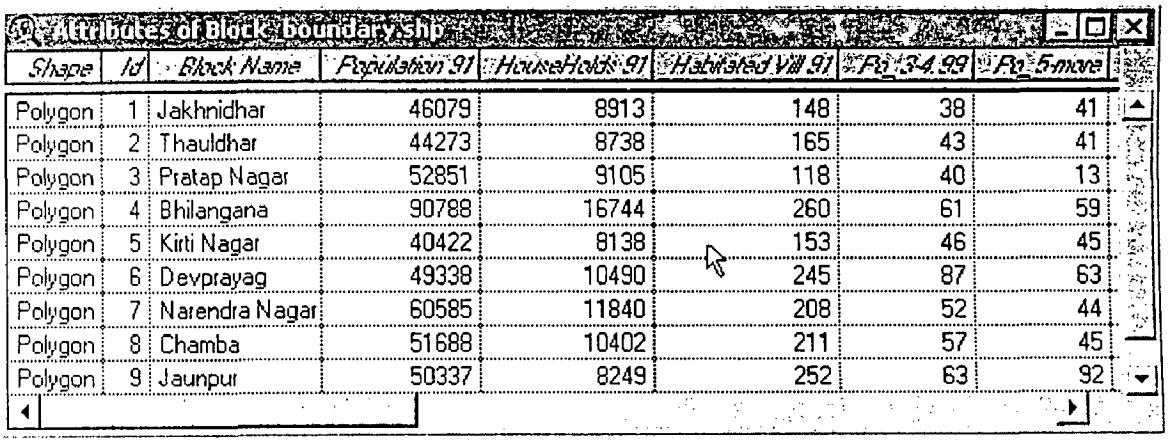
TEHRI GARHWAL DISTRICT



7.2.2.4. POST OFFICE:

In Tehri district, villages do not have this facility as required. 37 % of the Devprayag district do not have post office within 5 km distance. And 30 to 35 % villages in Pratap Nagar and Kirti Nagar blocks as shown in map 24.

Figure 7.19: Post Office

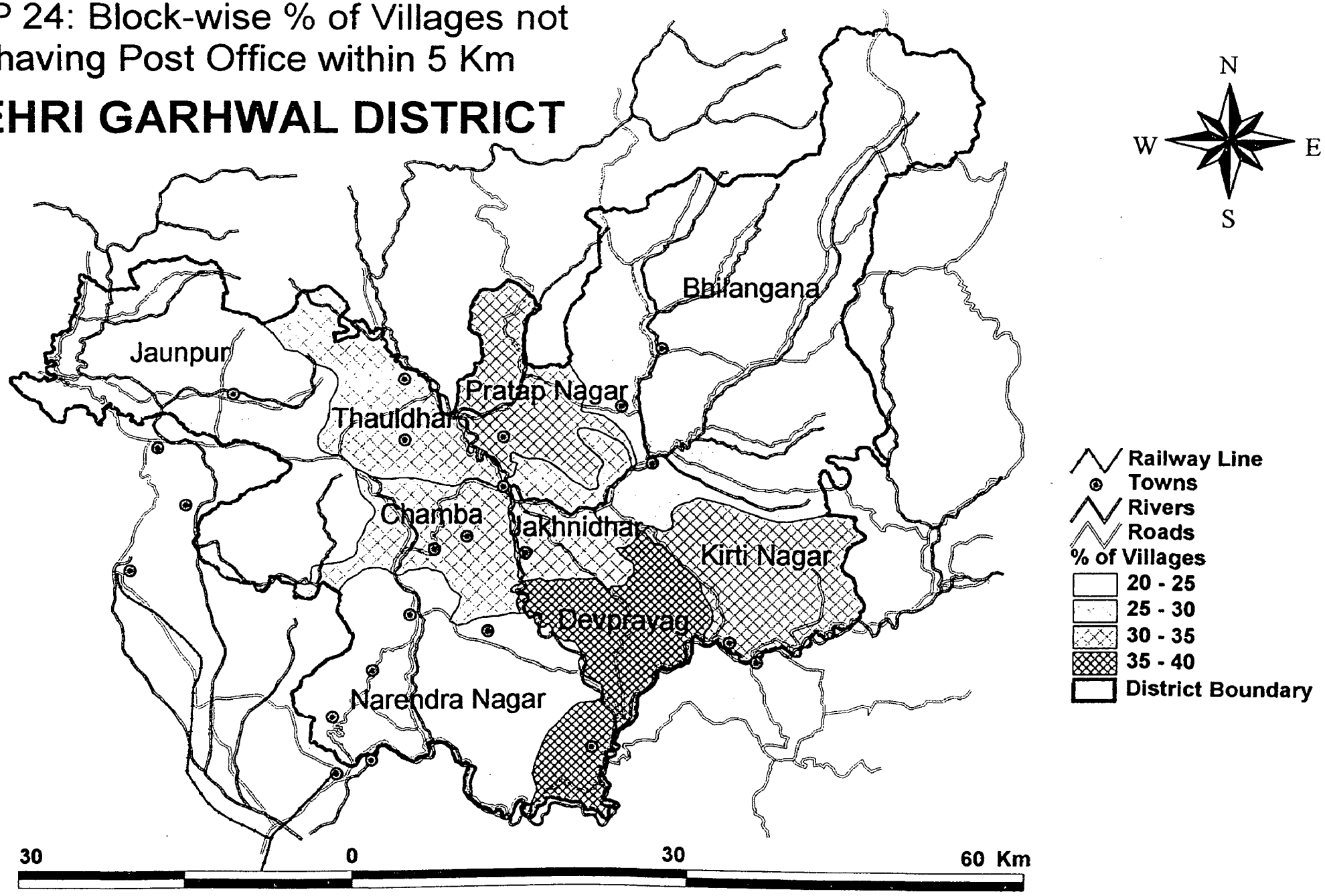


Attributes of Block_boundary.shp

Shape	Id	Block Name	Population 91	HouseHolds 91	Habitated Vill 91	Pt_3-4.99	Pt_5-more
Polygon	1	Jakhnidhar	46079	8913	148	38	41
Polygon	2	Thauldhar	44273	8738	165	43	41
Polygon	3	Pratap Nagar	52851	9105	118	40	13
Polygon	4	Bhilangana	90788	16744	260	61	59
Polygon	5	Kirti Nagar	40422	8138	153	46	45
Polygon	6	Devprayag	49338	10490	245	87	63
Polygon	7	Narendra Nagar	60585	11840	208	52	44
Polygon	8	Chamba	51688	10402	211	57	45
Polygon	9	Jaunpur	50337	8249	252	63	92

MAP 24: Block-wise % of Villages not having Post Office within 5 Km

TEHRI GARHWAL DISTRICT



7.2.2.5. TELEPHONE FACILITY:

In case of communication facility, 30 to 45 % villages of Bhilngana and Pratap Nagar block do not have telephone facility within 5 km range. Jaunpur and Thauldhar blocks are laso have this facility in less number as 60 to 75 % of villages are more than 5 km raw away from this facility.

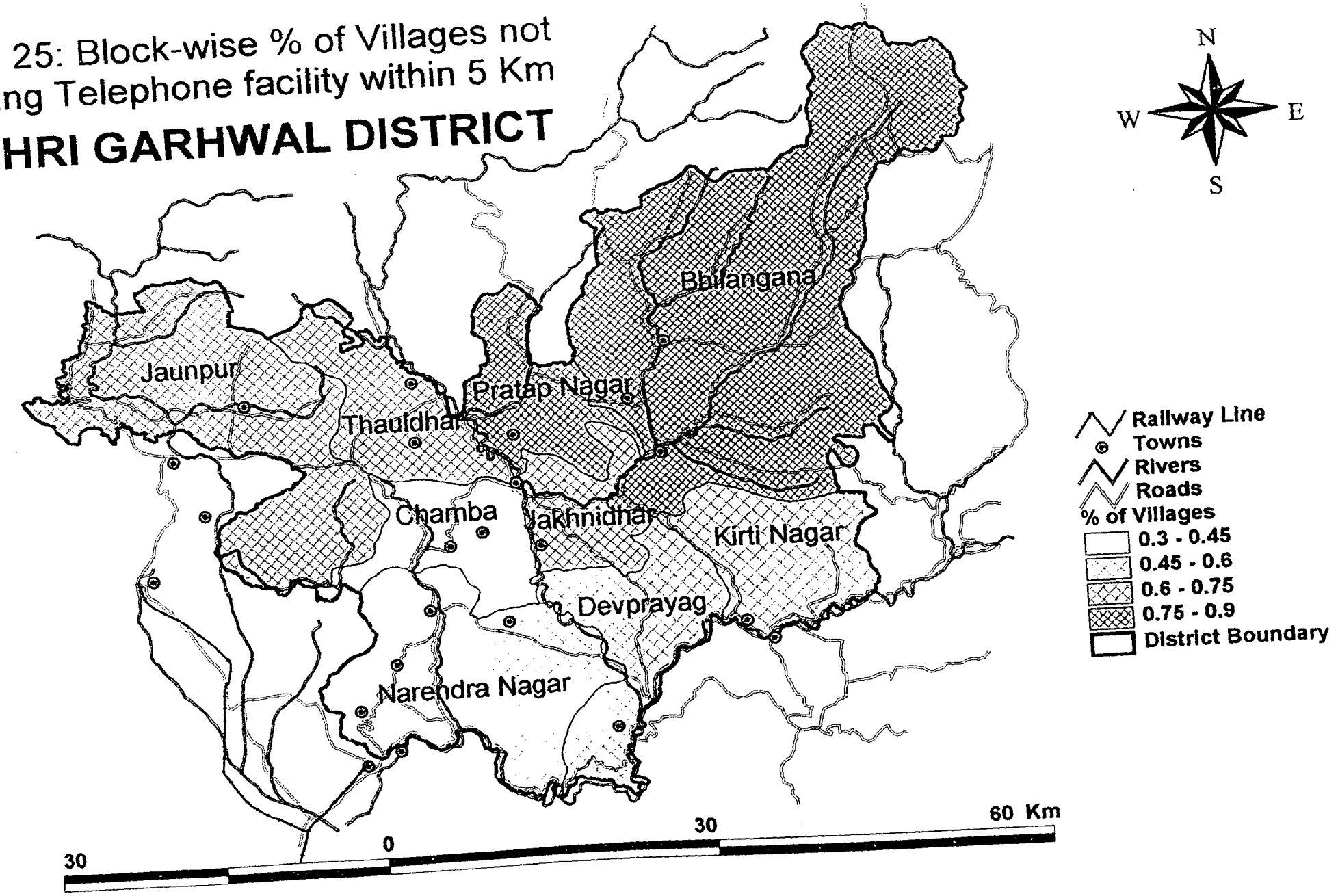
Figure 7.20: Public Call Office (PCO)

Attributes of Block_Boundary.shp

Shape	Id	Block Name	Population 91	HouseHolds 91	Habitated Vill 91	Pop_3-4.99	Pop_5-more
Polygon	1	Jakhnidhar	46079	8913	148	21	106
Polygon	2	Thauldhar	44273	8738	165	11	122
Polygon	3	Pratap Nagar	52851	9105	118	7	104
Polygon	4	Bhilangana	90788	16744	260	9	235
Polygon	5	Kirti Nagar	40422	8138	153	21	81
Polygon	6	Devprayag	49338	10490	245	60	116
Polygon	7	Narendra Nagar	60585	11840	208	48	103
Polygon	8	Chamba	51688	10402	211	47	73
Polygon	9	Jaunpur	50337	8249	252	39	165

MAP 25: Block-wise % of Villages not having Telephone facility within 5 Km

TEHRI GARHWAL DISTRICT



In present study, main emphasis is to derive such indices which reflect the level of infrastructural development of each village presently and potential for future development this mainly depends upon the identification of villages not having facilities and identification of villages having recourse potential for development.

8.1 IDENTIFICATION OF PLANNING PROBLEMS OF VILLAGES

The village level planning problems can be categorized as per their priority, into two groups:

Primary needs	Secondary needs
Water supply	Access roads
Education	Post office
Medical/ Health	Telephone
Electricity/ Power	Fair price shops
	Market

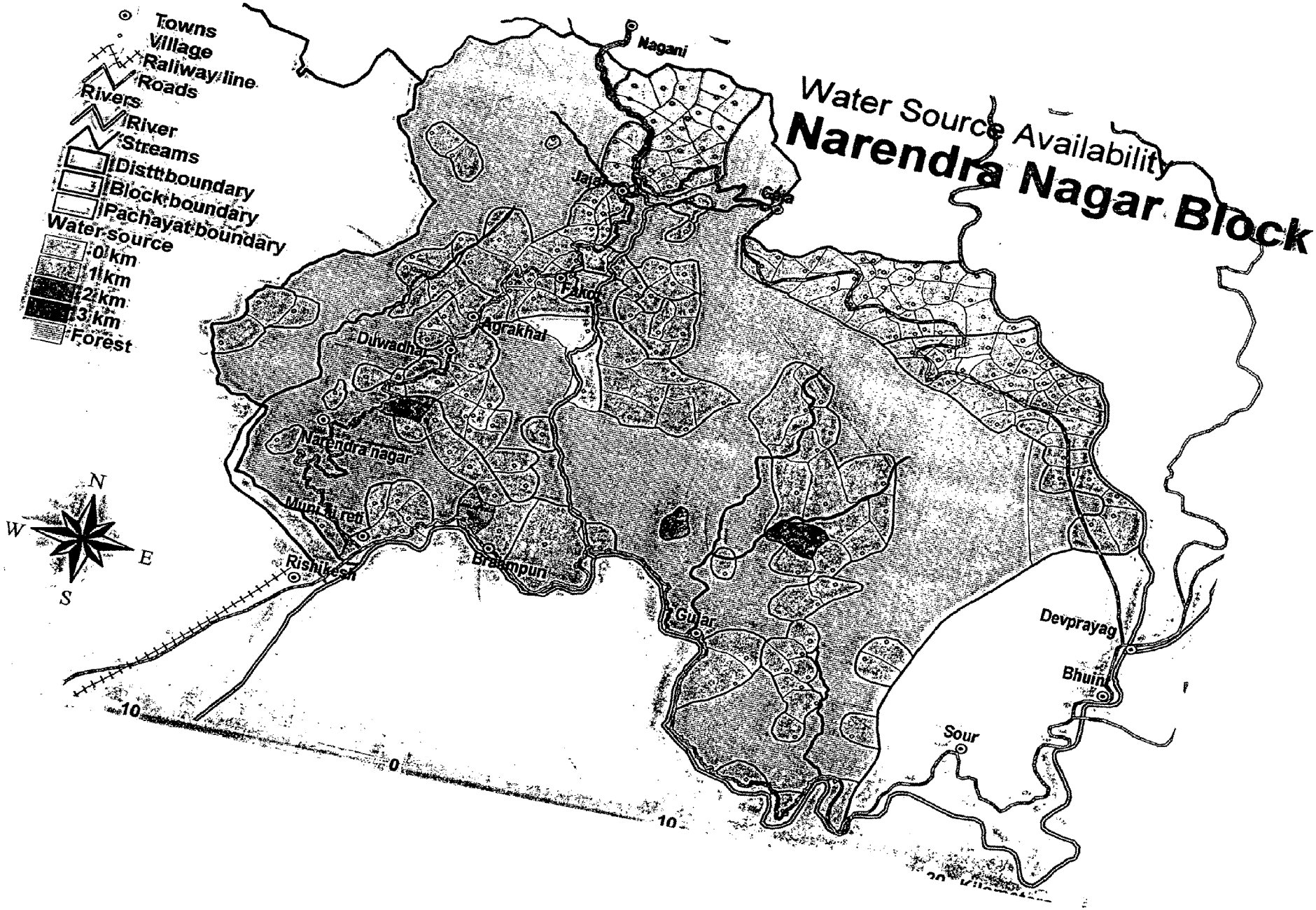
8.1.1. WATER:

Water is a most basic human need and in absence of it no one can survive. In Narendra Nagar Block, 5 villages do not have water source in the village or within walking (500 meter) distance. In three villages it is at the distance of 3 km.

Figure 8.1: Distance of water Source from villages.

Attributes of Village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Litrates	Water Source
Point	67	Kharsh	Banali	231	64	1
Point	103	Jamari katal	Timli	48	21	2
Point	116	Timli	Timli	1426	363	3
Point	127	Silkani	Bairai Gaon	315	79	3
Point	92	Badra talla	Timli	257	95	3


Towns
Village
Raliway line
Roads
Rivers
River
Streams
Distt boundary
Block boundary
Pachayat boundary
Water source
0 km
1 km
2 km
3 km
Forest
Water Source Availability
Narendra Nagar Block
Nagani
Jaja
Gaja
Pakot
Agrakhal
Dulwadhar
Narendra nagar
Muni ki ren
Rishikesh
Brahmpuri
Gujar
Devprayag
Bhuint
Sour
N
W
E
S
10
0
10

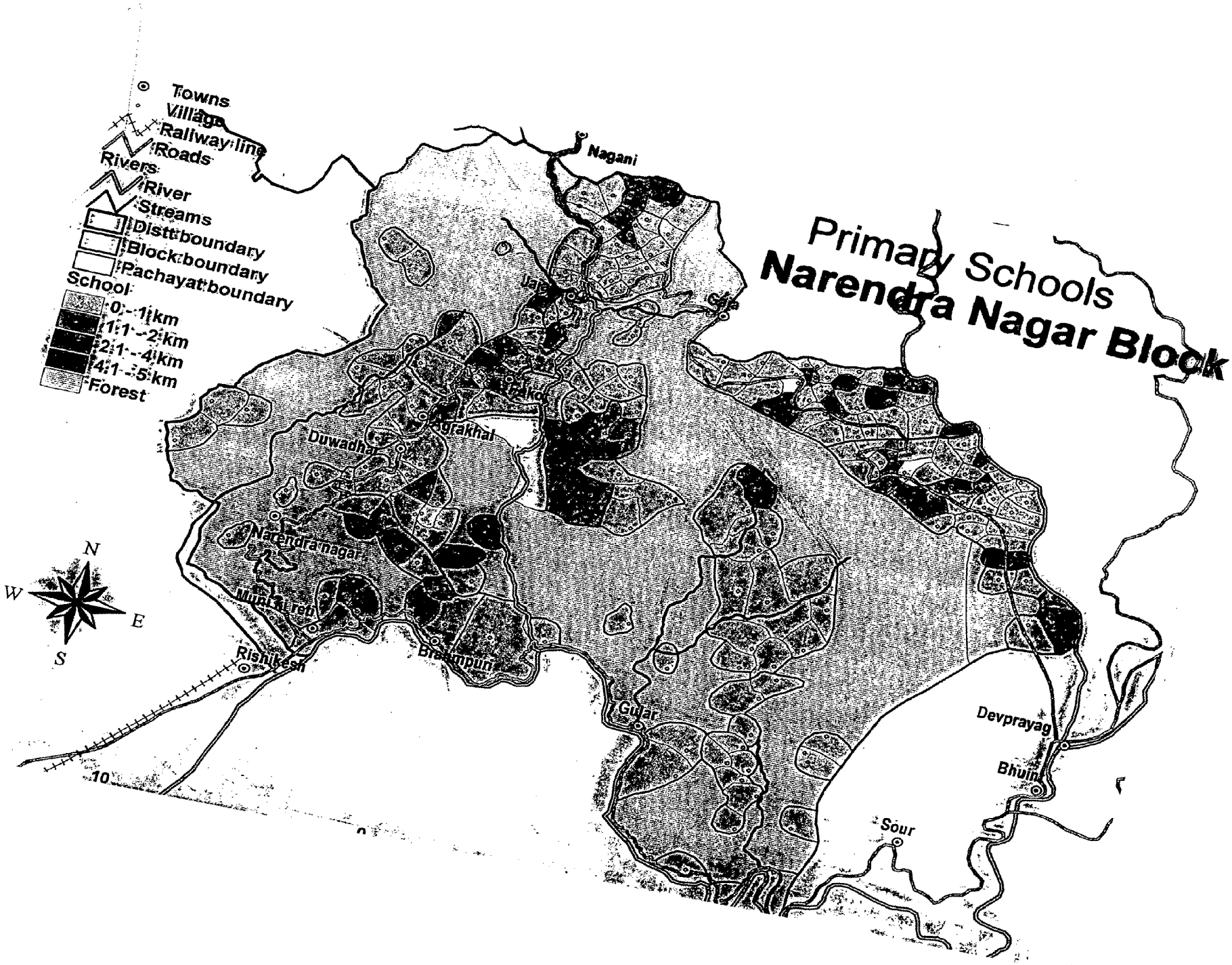
8.1.2. EDUCATION:

The level of social development of a village/ settlement mainly depends on education facility available. 123 villages have primary school within the village or at walking distance (500 mt.). And 16 villages do not have this facility within 3 km. distance. Most of the villages falling in this category are from Timli Nyaya Panchayat.

Figure 8.2: Distance of Junior Basic School from villages.

Attributes of Village.shp

Shape	Id	Village Name	Altitude	Nyaya Panchayat Name	Population	Literates	Junior Basic School	F
Point	156	Kandari gaon	1200	Man gaon	99	20	3.00	
Point	61	Pokhari	1350	Bhaitan	61	31	3.00	
Point	188	Saud	600	Ranakot	186	33	3.00	
Point	94	Barkoat	1350	Timli	69	38	3.00	
Point	102	Kuee	1050	Timli	104	16	3.00	
Point	176	Khola	600	Man gaon	81	28	3.00	
Point	90	Khakhoor	1000	Banali	165	34	3.00	
Point	118	Jamola	1250	Bairai Gaon	304	68	3.00	
Point	106	Matiyala	700	Timli	137	52	3.00	
Point	47	Tachhla	1150	Bhaitan	176	93	3.00	
Point	208	Maroda	850	Ranakot	124	44	3.00	
Point	17	Salam Khet	1650	Ampata	4	1	4.00	
Point	213	Sera	600	Ranakot	39	9	4.00	
Point	111	Bandhan	1500	Timli	63	6	5.00	
Point	112	Pungarh	1000	Timli	45	3	5.00	
Point	109	Talai lambadi	900	Timli	107	31	5.00	


Towns
Village
Railway line
Roads
Rivers
River
Streams
Distt boundary
Block boundary
Pachayat boundary
School
0 - 1 km
1.1 - 2 km
2.1 - 4 km
4.1 - 5 km
Forest
Primary Schools
Narendra Nagar Block
Nagani
Jaj
Duwadha
Agrakhal
Narendra nagar
Rishikesh
Gular
Devprayag
Bhuin
Sour
N
W
E
S
10

8.1.3. HEALTH FACILITIES:

In Narendra Nagar Block, only 27 villages have health facility within 1 km. and 75 villages do not have this facility within 5 km. distance. And in 11 villages people walk more than 10 km. for medical facility.

Figure 8.3: Distance of health facility from villages.

Attributes of Village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Public Health Centre
Point	68	Dewali	Banali	353	111	5.00
Point	91	Dangoo	Banali	105	28	5.00
Point	116	Timli	Timli	1426	363	5.00
Point	140	Badeer	Bugala	126	57	5.00
Point	60	Adada	Bhaitan	421	114	5.00
Point	126	Pajai gaon	Bairai Gaon	246	62	5.00
Point	113	Manjiyari	Timli	464	115	5.00
Point	29	Adwani	Ampata	316	100	5.00
Point	130	Lodashi	Bairai Gaon	686	204	5.00
Point	24	Ampata	Ampata	344	141	5.00
Point	112	Pungarh	Timli	45	3	5.00
Point	76	Dagar	Banali	257	92	5.00
Point	80	Soni	Banali	322	131	5.00
Point	100	Ghughtiyani talli	Timli	177	78	5.00
Point	43	Badeda Malla	Bhaitan	49	13	5.00
Point	18	Maun	Ampata	595	191	5.00
Point	31	Berani Chhoti	Ampata	176	51	5.00
Point	58	Raudeli	Bhaitan	272	83	5.00
Point	158	Pokhkri	Man gaon	115	74	5.00
Point	7	Chiriyali Malli	Ampata	155	48	5.00
Point	88	Padodi patesari	Banali	61	23	5.00
Point	114	Mathiyali	Timli	882	222	5.00
Point	46	Malas	Bhaitan	93	39	5.00
Point	163	Amasari gaon	Man gaon	360	84	5.00
Point	87	Bhekarki talli	Banali	170	53	5.00
Point	90	Khakhoor	Banali	165	34	5.00
Point	129	Chameli	Bairai Gaon	489	180	5.00
Point	109	Talai lambadi	Timli	107	31	5.00
Point	195	Shrikot	Ranakot	279	75	5.00
Point	210	Bhadani kapoori	Ranakot	383	117	5.00
Point	203	Gadli may gahar	Ranakot	175	65	5.00
Point	205	Jamari	Ranakot	129	45	5.00
Point	179	Palkot	Ranakot	263	99	5.00

Figure: Continued.

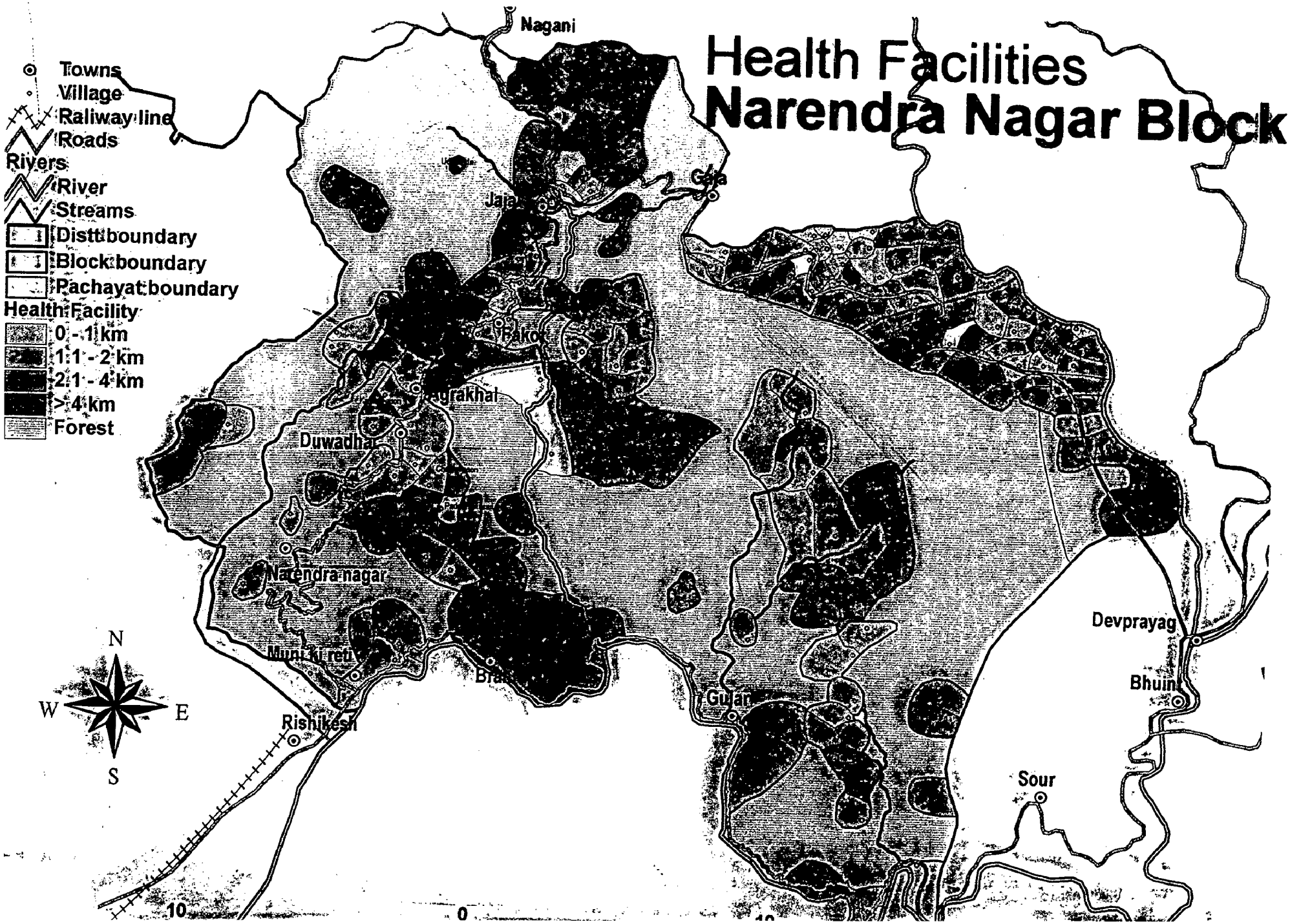
Attributes of Watershed

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Public Health Centre
Point	169	Adali	Man gaon	111	42	6.00
Point	79	Bagar	Banali	19	6	6.00
Point	200	Sakanyani	Ranakot	208	60	6.00
Point	49	Bemar	Bhaitan	65	38	6.00
Point	102	Kuee	Timli	104	16	6.00
Point	211	Niger	Ranakot	279	82	6.00
Point	101	Neer	Timli	490	188	6.00
Point	20	Sweer	Ampata	456	193	6.00
Point	137	Bugala	Bugala	324	161	6.00
Point	136	Mundala	Bugala	345	115	6.00
Point	206	Mayan gaon	Ranakot	144	29	6.00
Point	193	Bhutali	Ranakot	153	56	6.00
Point	30	Amsari	Ampata	49	11	6.00
Point	168	Pendars	Man gaon	185	88	6.00
Point	66	Kudarna	Banali	574	314	6.00
Point	196	Ranakot	Ranakot	873	238	6.00
Point	77	Talai	Banali	179	102	6.00

Figure: Continued.

Attributes of Watershed

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Public Health Centre
Point	165	Bairola	Man gaon	698	332	7.00
Point	17	Salam Khet	Ampata	4	1	7.00
Point	50	Hadi sera	Bhaitan	160	50	7.00
Point	94	Barkoat	Timli	69	38	7.00
Point	98	Dhaloowala	Banali	5855	0	8.00
Point	149	Dawara	Man gaon	146	60	8.00
Point	135	Mandiyari gaon	Bugala	357	111	8.00
Point	105	Bawani	Timli	689	188	8.00
Point	150	Bhatoli	Man gaon	123	57	8.00
Point	32	Berani Bari	Ampata	236	88	8.00
Point	9	Teepali	Ampata	231	93	8.00
Point	55	Agar	Bhaitan	587	250	9.00
Point	142	Singtali	Bugala	195	66	9.00
Point	152	Dadreli	Man gaon	294	111	9.00
Point	204	Pali Kolsari	Ranakot	448	143	10.00
Point	148	Falsiri	Man gaon	385	179	10.00
Point	122	Pipri	Bairai Gaon	160	35	10.00
Point	1	Udkhanda	Ampata	182	84	10.00
Point	138	Nasogi	Bugala	228	74	10.00
Point	147	Jaycot	Man gaon	578	162	10.00
Point	25	Koti	Ampata	266	98	11.00
Point	36	kukhai Talli	Bhaitan	271	76	11.00
Point	153	Baman gaon	Man gaon	770	318	11.00
Point	21	Pali Kakar Sari	Ampata	173	70	11.00
Point	139	Gagalasi	Bugala	569	202	16.00


Health Facilities
Narendra Nagar Block
Towns
Village
Raliway line
Roads
Rivers
River
Streams
Distt boundary
Block boundary
Pachayat boundary
Health Facility
0 - 1 km
1.1 - 2 km
2.1 - 4 km
> 4 km
Forest
Nagani
Jaja
Gaja
Pako
Duwadhar
Narendra nagar
Muni ki reti
Rishikesh
Gular
Devprayag
Bhuin
Sour
N
S
E
W
10
0

8.1.4. ELECTRICITY:

Out of 208 villages, only 155 villages are electrified, rest 53 villages do not have electric facility.

Figure 8.4: Distance of electricity facility from vollages.

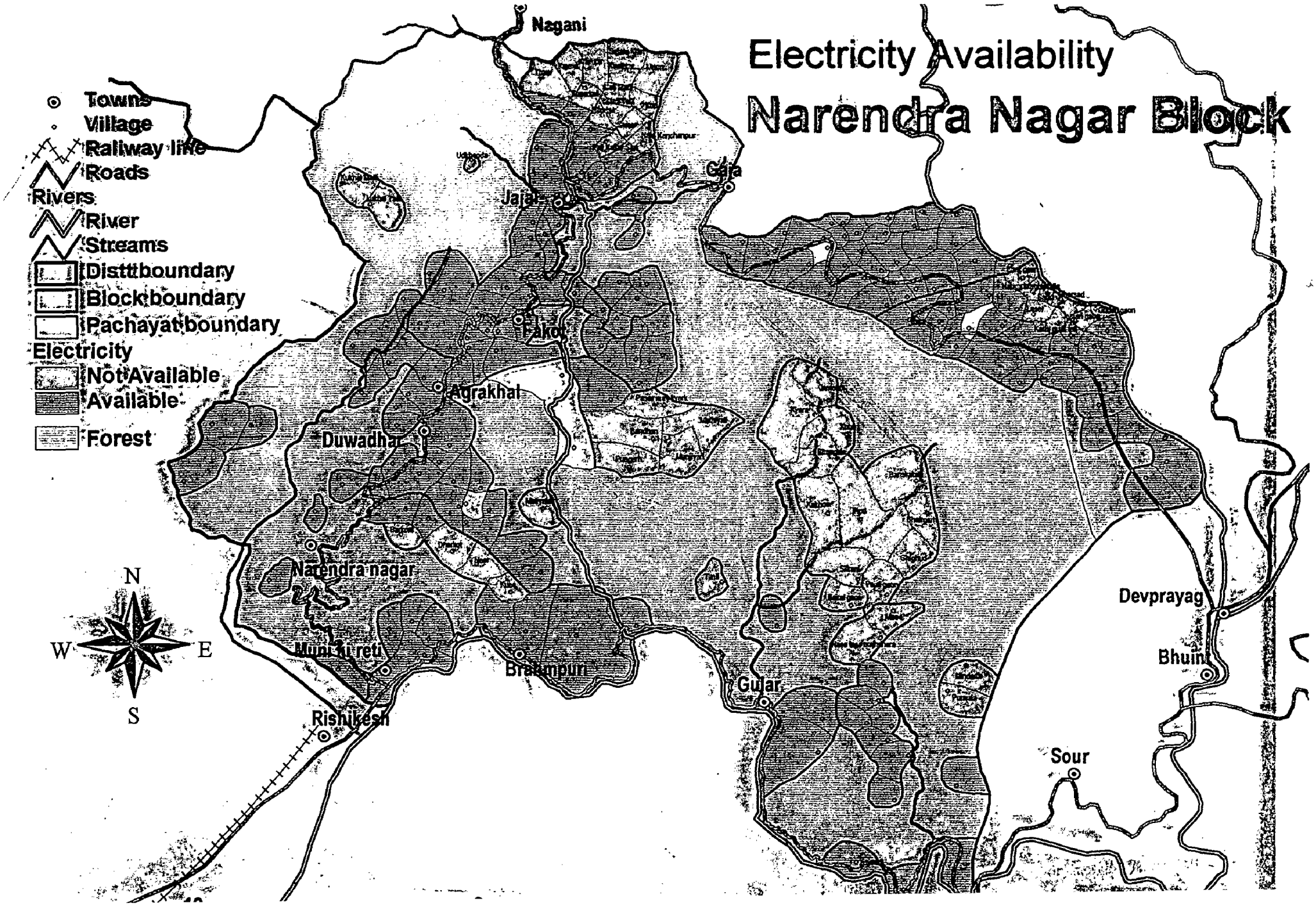
Attributes of village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Litrates	E
Point	25	Koti	Ampata	266	98	N
Point	150	Bhatoli	Man gaon	123	57	N
Point	21	Pali Kakar Sari	Ampata	173	70	N
Point	152	Dadreli	Man gaon	294	111	N
Point	148	Falsiri	Man gaon	385	179	N
Point	24	Ampata	Ampata	344	141	N
Point	149	Dawara	Man gaon	146	60	N
Point	142	Singtali	Bugala	195	66	N
Point	141	Atali	Bugala	308	118	N
Point	28	Gaindi	Ampata	239	94	N
Point	29	Adwani	Ampata	316	100	N
Point	147	Jaycot	Man gaon	578	162	N
Point	50	Hadi sera	Bhaitan	160	50	N
Point	213	Sera	Ranakot	39	9	N
Point	109	Talai lambadi	Timli	107	31	N
Point	69	Kakhil	Banali	234	106	N
Point	102	Kuee	Timli	104	16	N
Point	61	Pokhari	Bhaitan	61	31	N
Point	1	Udkhanda	Ampata	182	84	N
Point	139	Gagalasi	Bugala	569	202	N
Point	63	Banoli malli	Bhaitan	75	21	N
Point	118	Jamola	Bairai Gaon	304	68	N
Point	115	Shivpuri	Timli	151	56	N
Point	56	Semali katal	Bhaitan	33	14	N
Point	106	Matiyala	Timli	137	52	N
Point	100	Ghughtiyani talli	Timli	177	78	N
Point	46	Malas	Bhaitan	93	39	N
Point	66	Kudarna	Banali	574	314	N
Point	172	Gumal gaon	Man gaon	270	129	N
Point	90	Khakhoor	Banali	165	34	N
Point	140	Badeer	Bugala	126	57	N
Point	138	Nasogi	Bugala	228	74	N
Point	55	Agar	Bhaitan	587	250	N
Point	112	Pungarh	Timli	45	3	N

Figure: Continued.

Attributes of Village_shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Female
Point	96	Ghughtiyani malli	Timli	112	61	N
Point	36	kukhai Talli	Bhaitan	271	76	N
Point	198	Kharsara	Ranakot	418	128	N
Point	191	Ghorsad	Ranakot	166	27	N
Point	95	Dharkot	Timli	172	56	N
Point	205	Jamari	Ranakot	129	45	N
Point	188	Saud	Ranakot	186	33	N
Point	17	Salam Khet	Ampata	4	1	N
Point	181	Guriyali chhoti	Ranakot	88	32	N
Point	180	Guriyali bari	Ranakot	208	74	N
Point	94	Barkoat	Timli	69	38	N
Point	176	Khola	Man gaon	81	28	N
Point	208	Maroda	Ranakot	124	44	N
Point	158	Pokhkri	Man gaon	115	74	N
Point	84	Sarswad	Banali	82	23	N
Point	202	Saundai	Ranakot	48	11	N
Point	9	Teepali	Ampata	231	93	N
Point	156	Kandari gaon	Man gaon	99	20	N
Point	153	Baman gaon	Man gaon	770	318	N
Point	25	Koti	Ampata	266	98	N
Point	150	Bhatoli	Man gaon	123	57	N
Point	21	Pali Kakar Sari	Ampata	173	70	N
Point	152	Dadreli	Man gaon	294	111	N
Point	148	Falsiri	Man gaon	385	179	N
Point	24	Ampata	Ampata	344	141	N
Point	149	Dawara	Man gaon	146	60	N
Point	142	Singtali	Bugala	195	66	N
Point	141	Atali	Bugala	308	118	N
Point	28	Gaindi	Ampata	239	94	N
Point	29	Adwani	Ampata	316	100	N
Point	147	Jaycot	Man gaon	578	162	N
Point	50	Hadi sera	Bhaitan	160	50	N
Point	213	Sera	Ranakot	39	9	N
Point	109	Talai lambadi	Timli	107	31	N


Electricity Availability
Narendra Nagar Block
Towns
Village
Railway line
Roads
Rivers
River
Streams
Disttboundary
Blockboundary
Pachayatboundary
Electricity
Not Available
Available
Forest
N
W
E
S
Nagani
Jajal
Gaja
Takot
Agrakhal
Duwadhar
Narendra nagar
Muni ki reti
Brahmpuri
Rishikesh
Gujar
Devprayag
Bhuin
Sour

8.1.5. ACCESS ROAD:

The block have hilly terrain has many villages located far away from the vehicular roads. Only 30 villages are within the 1 km distance from the road. And 156 (75 %) villages are more than 1 km far from the road. 24 villages need to link immediately with road because they are situated more than 10 km. far from road.

Distance from Metalled road	No of Village (Total 208 Villages)
1.0 Km	30
1.1 to 2.0 Km	25
2.1 to 4.0 Km	44
> 4.0 km	57
> 1 km	156

Figure 8.5: Distance of metalled road from villages.

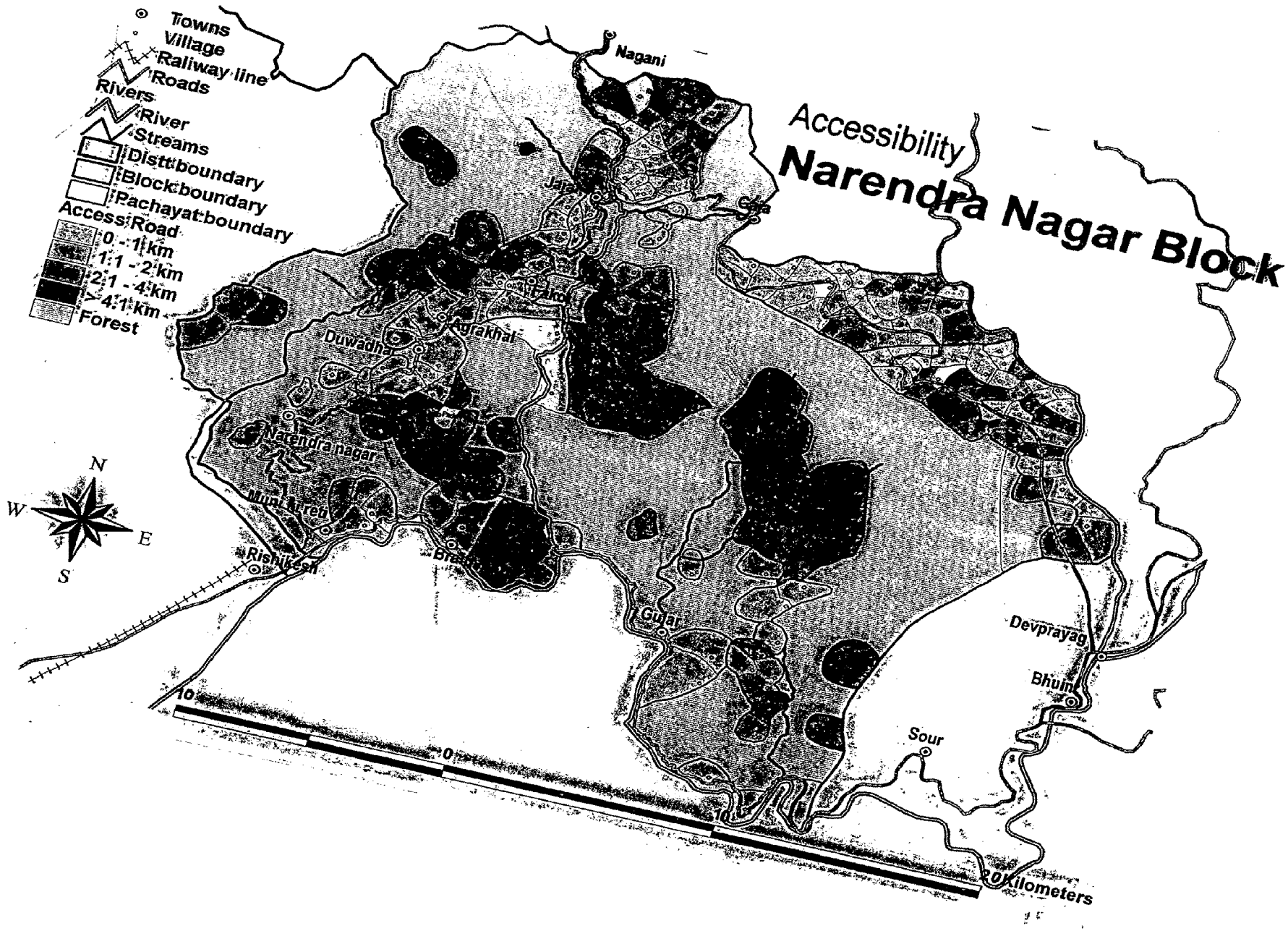
Attributes of village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Metal Road	F
Point	68	Dewali	Banali	353	111	5.00	
Point	195	Shrikot	Ranakot	279	75	5.00	
Point	21	Pali Kakar Sari	Ampata	173	70	5.00	
Point	157	Palogi	Man gaon	111	49	5.00	
Point	77	Talai	Banali	179	102	5.00	
Point	140	Badeer	Bugala	126	57	5.00	
Point	18	Maun	Ampata	595	191	5.00	
Point	129	Chameli	Bairai Gaon	489	180	5.00	
Point	203	Gadli may gahar	Ranakot	175	65	5.00	
Point	210	Bhadani kapoori	Ranakot	383	117	5.00	
Point	163	Adali	Man gaon	111	42	5.00	
Point	174	Sain	Man gaon	248	107	5.00	
Point	200	Sakanyani	Ranakot	208	60	6.00	
Point	196	Ranakot	Ranakot	873	238	6.00	
Point	117	Kyara	Bairai Gaon	364	62	6.00	
Point	100	Ghughtiyani talli	Timli	177	78	6.00	
Point	206	Mayan gaon	Ranakot	144	29	6.00	
Point	211	Niger	Ranakot	279	82	6.00	
Point	198	Kharsara	Ranakot	418	128	6.00	
Point	94	Barkoat	Timli	69	38	6.00	
Point	139	Gagalasi	Bugala	569	202	7.00	
Point	90	Khakhoor	Banali	165	34	7.00	
Point	89	Ars	Banali	145	57	7.00	
Point	166	Sountiyal gaon	Man gaon	170	66	7.00	
Point	153	Baman gaon	Man gaon	770	318	7.00	
Point	205	Jamari	Ranakot	129	45	7.00	

Figure: Continued.

Attributes of Villageship

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Area	F
Point	9	Teepali	Ampata	231	93	8.00	
Point	98	Dhaloowala	Banali	5855	0	8.00	
Point	96	Ghughtiyani malli	Timli	112	61	8.00	
Point	202	Saundai	Ranakot	48	11	8.00	
Point	97	Pathau	Timli	169	67	9.00	
Point	152	Dadreli	Man gaon	294	111	9.00	
Point	142	Singtali	Bugala	195	66	9.00	
Point	135	Mandiyari gaon	Bugala	357	111	10.00	
Point	204	Pali Kolsari	Ranakot	448	143	10.00	
Point	64	Daur mai kanda	Banali	555	198	10.00	
Point	101	Neer	Timli	490	188	10.00	
Point	150	Bhatoli	Man gaon	123	57	12.00	
Point	149	Dawara	Man gaon	146	60	12.00	
Point	6	Pipaleth	Ampata	531	178	12.00	
Point	2	Than	Ampata	309	93	12.00	
Point	104	Kyarki	Timli	183	63	13.00	
Point	66	Kudarna	Banali	574	314	15.00	
Point	147	Jaycot	Man gaon	578	162	15.00	
Point	1	Udkhanda	Ampata	182	84	15.00	
Point	36	kukhai Talli	Bhaitan	271	76	16.00	
Point	156	Kandari gaon	Man gaon	99	20	17.00	
Point	213	Sera	Ranakot	39	9	18.00	
Point	208	Maroda	Ranakot	124	44	18.00	
Point	212	Dhoul dhar	Ranakot	49	20	18.00	
Point	148	Falsiri	Man gaon	385	179	19.00	
Point	118	Jamola	Bairai Gaon	304	68	20.00	
Point	112	Pungarh	Timli	45	3	20.00	
Point	176	Khola	Man gaon	81	28	22.00	
Point	17	Salam Khet	Ampata	4	1	22.00	
Point	188	Saud	Ranakot	186	33	23.00	
Point	109	Talai lambadi	Timli	107	31	24.00	


Accessibility
Narendra Nagar Block
Towns
Village
Raliway line
Roads
Rivers
River
Streams
Distt boundary
Block boundary
Pachayat boundary
Access Road
0 - 1 km
1.1 - 2 km
2.1 - 4 km
> 4.1 km
Forest
Nagani
Jaja
Duwadha
Agrakhal
Narendra nagar
Rishikesh
Gular
Devprayag
Bhuin
Sour
N
W
E
S
10
0
10
20 Kilometers

8.1.6. POST OFFICE:

In Narendra Nagar Block, only 33 villages have post office facility while 44 villages have this facility at the distance of 5 or more than 5 km. and 31 villages have post office within walking distance (1 km.).

Distance from post office	No of Village
1.0 Km	31
1.1 to 2.0 Km	48
2.1 to 4.0 Km	52
> 4.0 km	44
> 1 Km	175

Figure 8.6: Distance of post office from villages.

Attributes of Village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Post Office	F
Point	69	Kakhil	Banali	234	106	5.00	
Point	29	Adwani	Ampata	316	100	5.00	
Point	60	Adada	Bhaitan	421	114	5.00	
Point	31	Berani Chhoti	Ampata	176	51	5.00	
Point	157	Palogi	Man gaon	111	49	5.00	
Point	153	Baman gaon	Man gaon	770	318	5.00	
Point	163	Amasari gaon	Man gaon	360	84	5.00	
Point	150	Bhatoli	Man gaon	123	57	5.00	
Point	77	Talai	Banali	179	102	5.00	
Point	24	Ampata	Ampata	344	141	5.00	
Point	20	Sweer	Ampata	456	193	5.00	
Point	129	Chameli	Bairai Gaon	489	180	5.00	
Point	149	Dawara	Man gaon	146	60	5.00	
Point	140	Badeer	Bugala	126	57	5.00	
Point	18	Maun	Ampata	595	191	5.00	
Point	136	Mundala	Bugala	345	115	5.00	
Point	43	Badeda Malla	Bhaitan	49	13	5.00	
Point	114	Mathiyali	Timli	882	222	5.00	
Point	145	Purwala	Bugala	255	85	5.00	
Point	109	Talai lambadi	Timli	107	31	5.00	
Point	50	Hadi sera	Bhaitan	160	50	5.00	
Point	200	Sakanyani	Ranakot	208	60	5.00	
Point	197	Kothi malli tali	Ranakot	300	68	5.00	

Figure: Continued.

Attributes of Village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Post Office	F
Point	196	Ranakot	Ranakot	873	238	6.00	
Point	33	Gangsar Gaon	Ampata	83	15	6.00	
Point	117	Kyara	Bairai Gaon	364	62	6.00	
Point	66	Kudarna	Banali	574	314	6.00	
Point	85	Chamol gaon	Banali	187	90	6.00	
Point	205	Jamari	Ranakot	129	45	6.00	
Point	101	Neer	Timli	490	188	6.00	
Point	204	Pali Kolsari	Ranakot	448	143	7.00	
Point	55	Agar	Bhaitan	587	250	7.00	
Point	89	Ars	Banali	145	57	7.00	
Point	79	Bagar	Banali	19	6	7.00	
Point	21	Pali Kakar Sari	Ampata	173	70	8.00	
Point	9	Teepali	Ampata	231	93	8.00	
Point	202	Saundai	Ranakot	48	11	8.00	
Point	142	Singtali	Bugala	195	66	9.00	
Point	198	Kharsara	Ranakot	418	128	10.00	
Point	158	Pokhkri	Man gaon	115	74	10.00	
Point	122	Pipri	Bairai Gaon	160	35	11.00	
Point	139	Gagalasi	Bugala	569	202	13.00	
Point	1	Udkhanda	Ampata	182	84	15.00	
Point	36	kukhai Talli	Bhaitan	271	76	16.00	

8.1.7. TELEPHONE FACILITY:

In case of communication facility, only 13 villages have telephone connection and 15 villages within 1.0 km distance while 103 villages are far 5 km. or more than 5 km. and out 103 villages, 14 villages do not P C O within 10 km. distance.

Distance from telephone facility	No of Village
1.0 Km	15
1.1 to 2.0 Km	29
2.1 to 4.0 Km	48
> 4.0 km	103
> 1 Km	195

Figure 8.7: Distance of telephone facility from villages.

Attributes of village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	PCO	Cl
Point	77	Talai	Banali	179	102	5.00	
Point	114	Mathiyali	Timli	882	222	5.00	
Point	157	Palogi	Man gaon	111	49	5.00	
Point	56	Semali katal	Bhaitan	33	14	5.00	
Point	31	Berani Chhoti	Ampata	176	51	5.00	
Point	58	Raudeli	Bhaitan	272	83	5.00	
Point	141	Atali	Bugala	308	118	5.00	
Point	43	Badeda Malla	Bhaitan	49	13	5.00	
Point	163	Amasari gaon	Man gaon	360	84	5.00	
Point	91	Dangoo	Banali	105	28	5.00	
Point	19	Kuri	Ampata	471	209	5.00	
Point	178	Saundadi	Ranakot	201	112	5.00	
Point	60	Adada	Bhaitan	421	114	5.00	
Point	129	Chameli	Bairai Gaon	489	180	5.00	
Point	7	Chiriyali Malli	Ampata	155	48	5.00	
Point	174	Sain	Man gaon	248	107	5.00	
Point	66	Kudarna	Banali	574	314	6.00	
Point	193	Bhutali	Ranakot	153	56	6.00	
Point	33	Gangsar Gaon	Ampata	83	15	6.00	
Point	14	Atali Talli	Ampata	94	30	6.00	
Point	85	Chamol gaon	Banali	187	90	6.00	
Point	117	Kyara	Bairai Gaon	364	62	6.00	
Point	194	Thapalial gaon	Ranakot	98	16	6.00	
Point	101	Neer	Timli	490	188	6.00	
Point	100	Ghughtiyani talli	Timli	177	78	6.00	
Point	23	Chiriyali Talli	Ampata	97	36	6.00	
Point	200	Sakanyani	Ranakot	208	60	6.00	
Point	159	Bamankhola	Man gaon	42	20	6.00	
Point	182	Paweth	Ranakot	60	12	6.00	
Point	168	Pendars	Man gaon	185	88	6.00	
Point	179	Palkot	Ranakot	263	99	6.00	

Figure: Continued.

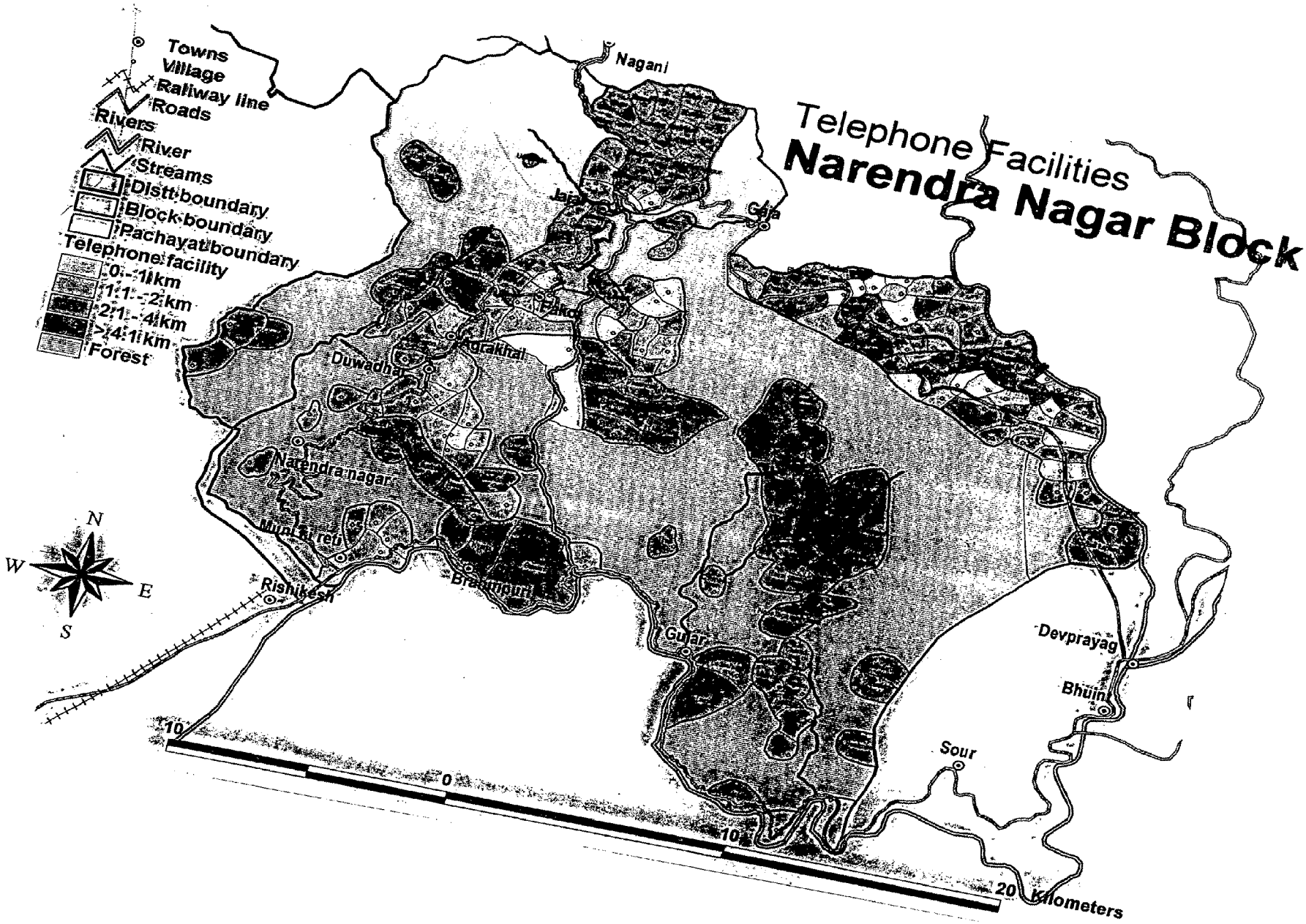
Attributes of Village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	FID	O
Point	3	Bidon Gaon	Ampata	203	76	7.00	
Point	196	Ranakot	Ranakot	873	238	7.00	
Point	145	Purwala	Bugala	255	85	7.00	
Point	10	Kaund	Ampata	30	18	7.00	
Point	212	Dhoul dhar	Ranakot	49	20	7.00	
Point	204	Pali Kolsari	Ranakot	448	143	7.00	
Point	89	Ars	Banali	145	57	7.00	
Point	79	Bagar	Banali	19	6	7.00	
Point	166	Sountiyal gaon	Man gaon	170	66	7.00	
Point	47	Tachhla	Bhaitan	176	93	7.00	
Point	106	Matiyala	Timli	137	52	8.00	
Point	125	Ghighud	Bairai Gaon	661	116	8.00	
Point	98	Dhaloowala	Banali	5855	0	8.00	
Point	198	Kharsara	Ranakot	418	128	8.00	
Point	96	Ghughtiyani malli	Timli	112	61	8.00	
Point	124	Bhairgarh	Bairai Gaon	213	36	8.00	
Point	136	Mundala	Bugala	345	115	8.00	
Point	103	Jamari katal	Timli	48	21	8.00	
Point	158	Pokhkri	Man gaon	115	74	8.00	
Point	61	Pokhari	Bhaitan	61	31	8.00	
Point	205	Jamari	Ranakot	129	45	8.00	
Point	202	Saundai	Ranakot	48	11	8.00	
Point	152	Dadreli	Man gaon	294	111	9.00	
Point	138	Nasogi	Bugala	228	74	10.00	
Point	197	Kothi malli tali	Ranakot	300	68	10.00	
Point	123	Banskatak	Bairai Gaon	554	136	10.00	
Point	122	Pipri	Bairai Gaon	160	35	11.00	
Point	25	Koti	Ampata	266	98	11.00	
Point	115	Shivpuri	Timli	151	56	12.00	
Point	149	Dawara	Man gaon	146	60	12.00	
Point	150	Bhatoli	Man gaon	123	57	12.00	
Point	143	Koudiyla	Bugala	131	57	13.00	
Point	15	Atali Malli	Ampata	127	64	13.00	
Point	46	Malas	Bhaitan	93	39	14.00	
Point	95	Dharkot	Timli	172	56	14.00	
Point	35	Kukhai Malli	Bhaitan	86	38	14.00	
Point	191	Ghorsad	Ranakot	166	27	14.00	

Figure: Continued.

Attributes of Village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Area	O
Point	181	Guriyali chhoti	Ranakot	88	32	15.00	
Point	20	Sweer	Ampata	456	193	15.00	
Point	28	Gaindi	Ampata	239	94	15.00	
Point	180	Guriyali bari	Ranakot	208	74	15.00	
Point	1	Udkhanda	Ampata	182	84	15.00	
Point	147	Jaycot	Man gaon	578	162	15.00	
Point	49	Bemar	Bhaitan	65	38	15.00	
Point	139	Gagalasi	Bugala	569	202	15.00	
Point	9	Teepali	Ampata	231	93	16.00	
Point	36	kukhai Talli	Bhaitan	271	76	16.00	
Point	50	Hadi sera	Bhaitan	160	50	16.00	
Point	24	Ampata	Ampata	344	141	16.00	
Point	29	Adwani	Ampata	316	100	16.00	
Point	69	Kakhil	Banali	234	106	16.00	
Point	156	Kandari gaon	Man gaon	99	20	17.00	
Point	140	Badeer	Bugala	126	57	17.00	
Point	30	Amsari	Ampata	49	11	17.00	
Point	142	Singtali	Bugala	195	66	17.00	
Point	54	Bhaigarki	Bhaitan	296	120	17.00	
Point	135	Mandiyari gaon	Bugala	357	111	18.00	
Point	55	Agar	Bhaitan	587	250	18.00	
Point	213	Sera	Ranakot	39	9	18.00	
Point	208	Maroda	Ranakot	124	44	18.00	
Point	148	Falsiri	Man gaon	385	179	19.00	
Point	21	Pali Kakar Sari	Ampata	173	70	19.00	
Point	90	Khakhoor	Banali	165	34	19.00	
Point	112	Pungarh	Timli	45	3	20.00	
Point	118	Jamola	Bairai Gaon	304	68	20.00	
Point	94	Barkoat	Timli	69	38	21.00	
Point	176	Khola	Man gaon	81	28	22.00	
Point	102	Kuee	Timli	104	16	22.00	
Point	17	Salam Khet	Ampata	4	1	22.00	
Point	153	Baman gaon	Man gaon	770	318	23.00	
Point	188	Saud	Ranakot	186	33	23.00	
Point	109	Talai lambadi	Timli	107	31	24.00	


Telephone Facilities
Narendra Nagar Block
Towns
Village
Railway line
Roads
Rivers
River
Streams
Distt boundary
Block boundary
Pachayat boundary
Telephone facility
0 - 1 km
1 1 - 2 km
2 1 - 4 km
>4 1 km
Forest
Nagani
Jaja
Gaja
Duwadhar
Narendra nagar
Rishikesh
Gular
Devprayag
Bhuin
Sour
N
W
E
S
10
0
10
20
Kilometers

8.1.8. FAIR PRICE SHOPS:

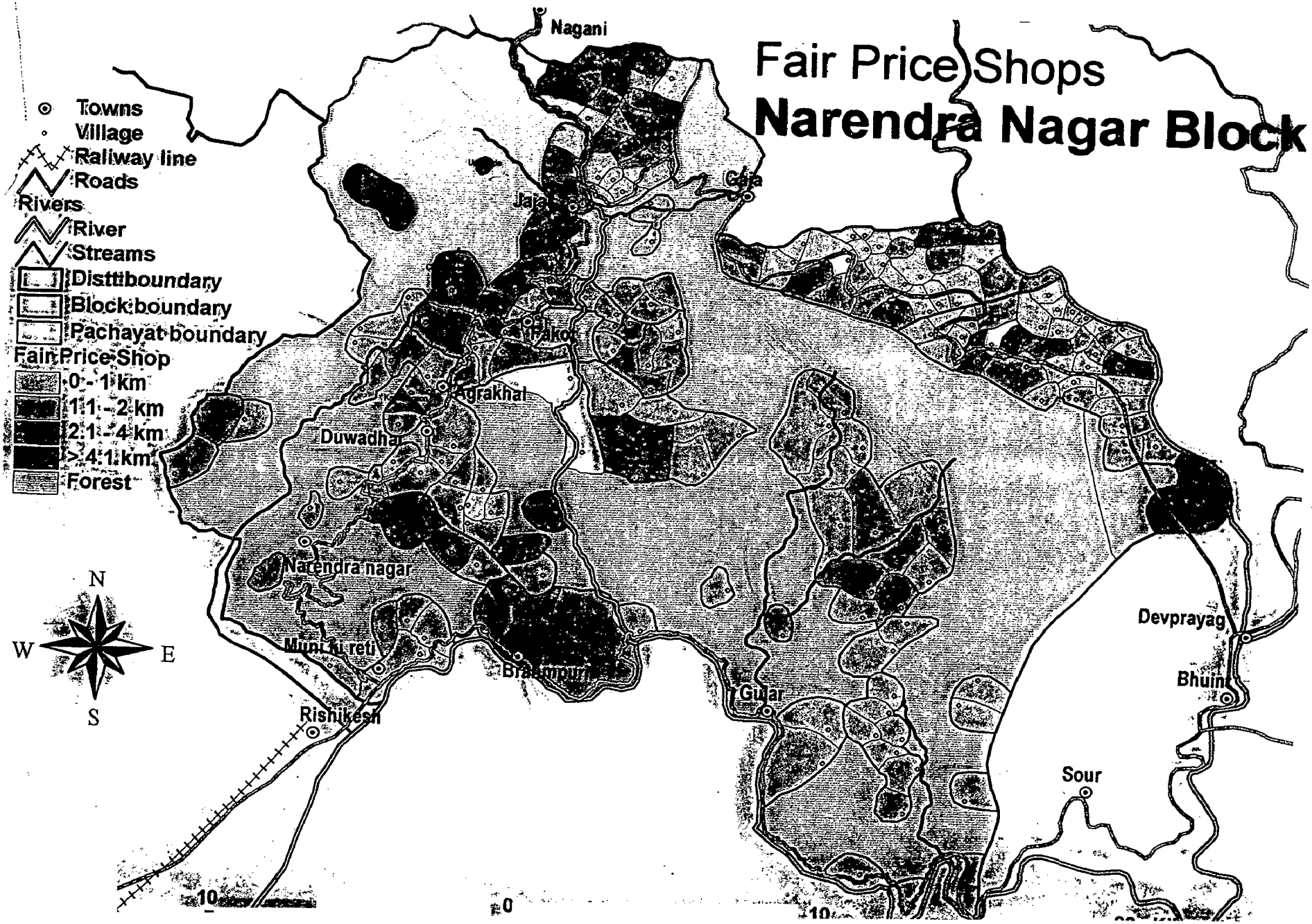
Narendra Nagar block has total 62 ration shops while 37 villages are within the 1 km distance. 66 villages are more than 2 km far from this facility while 3 villages are located more than 12 km. away from fair price shops.

Distance from fair price shop	No of Village
1.0 Km	37
1.1 to 2.0 Km	43
2.1 to 4.0 Km	40
> 4.0 km	26
> 1.0 Km	146

Figure 8.8: Distance of fair price shop from villages.

Attributes of Village shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Litrates	Fair Price Shop	A
Point	136	Mundala	Bugala	345	115	5.00	
Point	149	Dawara	Man gaon	146	60	5.00	
Point	158	Pokhkri	Man gaon	115	74	5.00	
Point	122	Pipri	Bairai Gaon	160	35	5.00	
Point	140	Badeer	Bugala	126	57	5.00	
Point	79	Bagar	Banali	19	6	5.00	
Point	153	Baman gaon	Man gaon	770	318	5.00	
Point	114	Mathiyali	Timli	882	222	5.00	
Point	150	Bhatoli	Man gaon	123	57	5.00	
Point	200	Sakanyani	Ranakot	208	60	5.00	
Point	60	Adada	Bhaitan	421	114	5.00	
Point	163	Amasari gaon	Man gaon	360	84	5.00	
Point	77	Talai	Banali	179	102	5.00	
Point	204	Pali Kolsari	Ranakot	448	143	5.00	
Point	196	Ranakot	Ranakot	873	238	6.00	
Point	33	Gangsar Gaon	Ampata	83	15	6.00	
Point	85	Chamol gaon	Banali	187	90	6.00	
Point	205	Jamari	Ranakot	129	45	6.00	
Point	55	Agar	Bhaitan	587	250	6.00	
Point	21	Pali Kakar Sari	Ampata	173	70	7.00	
Point	43	Badeda Malla	Bhaitan	49	13	7.00	
Point	9	Teepali	Ampata	231	93	8.00	
Point	142	Singtali	Bugala	195	66	9.00	
Point	139	Gagalasi	Bugala	569	202	12.00	
Point	1	Udkhanda	Ampata	182	84	15.00	
Point	36	kukhai Talli	Bhaitan	271	76	16.00	


Fair Price Shops
Narendra Nagar Block
Towns
Village
Railway line
Roads
Rivers
River
Streams
Distt boundary
Block boundary
Pachayat boundary
Fair Price Shop
0 - 1 km
1.1 - 2 km
2.1 - 4 km
> 4.1 km
Forest
N
W
E
S
Nagani
Jaja
Gaja
Thakot
Agrakhal
Duwadhar
Narendra nagar
Munj ki reti
Brahmpuri
Rishikesh
Gular
Devprayag
Bhuin
Sour
10
0
10

8.1.9. LOCAL MARKET:

Most of the villages do not have local market. Only 13 villages have local market within the villages. In 51 villages, people have to walk more than 10 km. for purchasing.

Distance from local market	No of Village
1.0 Km	24
1.1 to 2.0 Km	22
2.1 to 4.0 Km	59
> 4.0 km	90
> 1.0 Km	195

Figure 8.9: Distance of local market from villages.

Attributes of Villageship

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Litrates	Local Market	Pt
Point	129	Chameli	Bairai Gaon	489	180	5.00	
Point	204	Pali Kolsari	Ranakot	448	143	5.00	
Point	127	Silkani	Bairai Gaon	315	79	5.00	
Point	114	Mathiyali	Timli	882	222	5.00	
Point	79	Bagar	Banali	19	6	5.00	
Point	130	Lodashi	Bairai Gaon	686	204	5.00	
Point	163	Amasari gaon	Man gaon	360	84	5.00	
Point	66	Kudarna	Banali	574	314	5.00	
Point	93	Pater	Timli	26	7	5.00	
Point	134	Chauldi	Bugala	42	13	5.00	
Point	30	Amsari	Ampata	49	11	5.00	
Point	77	Talai	Banali	179	102	5.00	
Point	60	Adada	Bhaitan	421	114	5.00	
Point	122	Pipri	Bairai Gaon	160	35	5.00	
Point	174	Sain	Man gaon	248	107	5.00	
Point	140	Badeer	Bugala	126	57	5.00	
Point	144	Sasaman	Bugala	647	220	5.00	
Point	18	Maun	Ampata	595	191	5.00	
Point	58	Raudeli	Bhaitan	272	83	5.00	

Figure: Continued.

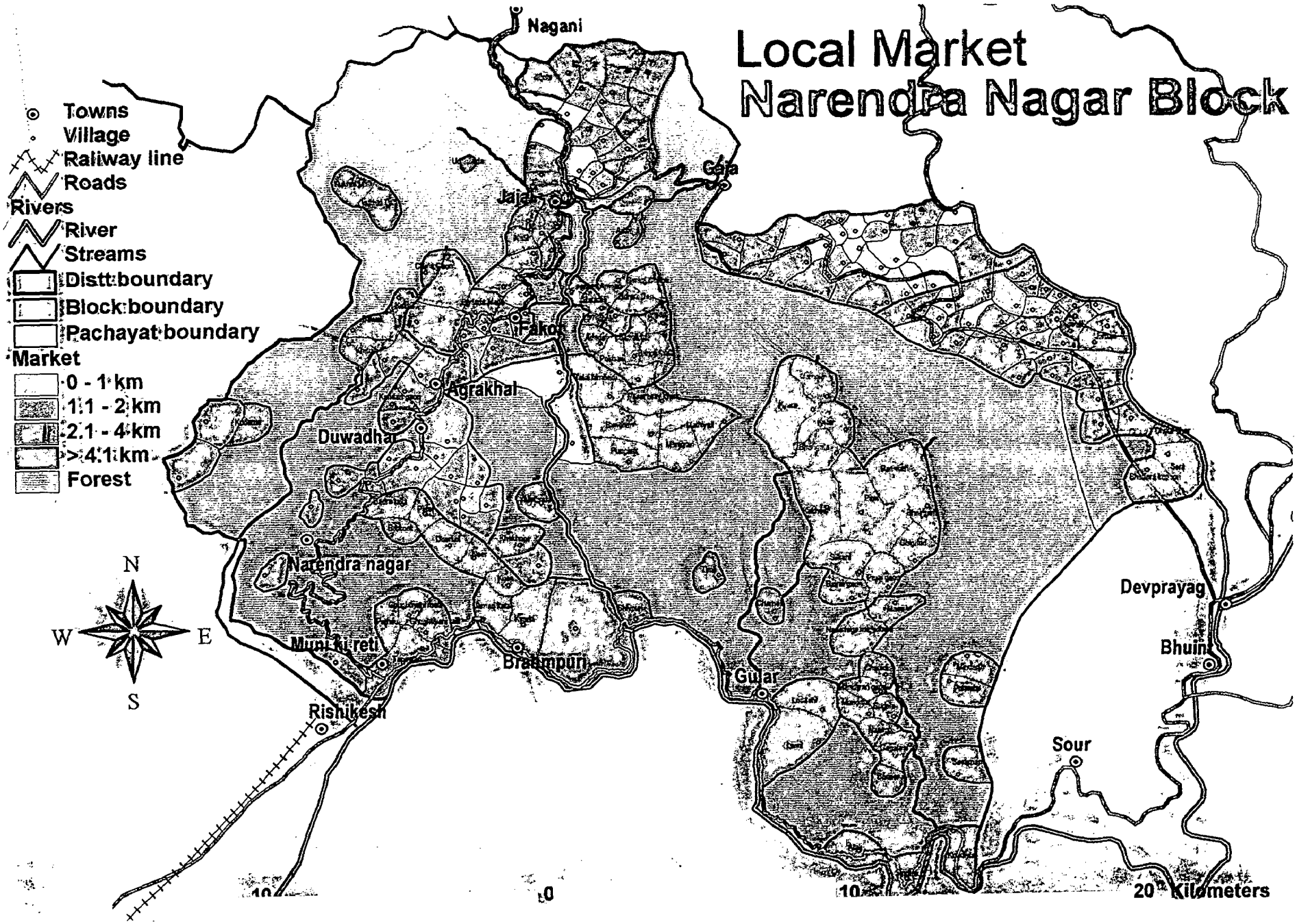
Attributes of Village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Area(Metres)	Pt
Point	33	Gangsar Gaon	Ampata	83	15	6.00	
Point	131	Lwail	Bairai Gaon	584	172	6.00	
Point	153	Baman gaon	Man gaon	770	318	6.00	
Point	55	Agar	Bhaitan	587	250	6.00	
Point	126	Pajai gaon	Bairai Gaon	246	62	6.00	
Point	37	Chald Gaon	Bhaitan	105	24	6.00	
Point	117	Kyara	Bairai Gaon	364	62	6.00	
Point	68	Dewali	Banali	353	111	6.00	
Point	43	Badeda Malla	Bhaitan	49	13	7.00	
Point	21	Pali Kakar Sari	Ampata	173	70	7.00	
Point	166	Sountiyal gaon	Man gaon	170	66	7.00	
Point	89	Ars	Banali	145	57	7.00	
Point	136	Mundala	Bugala	345	115	8.00	
Point	106	Matiyala	Timli	137	52	8.00	
Point	98	Dhaloowala	Banali	5855	0	8.00	
Point	9	Teepali	Ampata	231	93	8.00	
Point	105	Bawani	Timli	689	188	8.00	
Point	32	Berani Bari	Ampata	236	88	9.00	
Point	142	Singtali	Bugala	195	66	9.00	
Point	97	Pathau	Timli	169	67	9.00	
Point	101	Neer	Timli	490	188	10.00	
Point	64	Daur mai kanda	Banali	555	198	10.00	
Point	196	Ranakot	Ranakot	873	238	10.00	
Point	200	Sakanyani	Ranakot	208	60	10.00	
Point	205	Jamari	Ranakot	129	45	11.00	
Point	158	Pokhkri	Man gaon	115	74	12.00	
Point	150	Bhatoli	Man gaon	123	57	12.00	
Point	149	Dawara	Man gaon	146	60	12.00	
Point	198	Kharsara	Ranakot	418	128	12.00	
Point	2	Than	Ampata	309	93	12.00	
Point	139	Gagalasi	Bugala	569	202	12.00	
Point	6	Pipaleth	Ampata	531	178	12.00	
Point	104	Kyarki	Timli	183	63	13.00	
Point	202	Saundai	Ranakot	48	11	13.00	

Figure: Continued.

Attributes of Village.shp

Shape	Id	Village Name	Nyaya Panchayat Name	Population	Literates	Area	P.
Point	99	Tapowan	Timli	1488	933	14.00	
Point	5	Chaunpa	Ampata	211	131	14.00	
Point	147	Jaycot	Man gaon	578	162	15.00	
Point	1	Udkhanda	Ampata	182	84	15.00	
Point	36	kukhai Talli	Bhaitan	271	76	16.00	
Point	194	Thapalial gaon	Ranakot	98	16	16.00	
Point	137	Bugala	Bugala	324	161	16.00	
Point	182	Paweth	Ranakot	60	12	17.00	
Point	179	Palkot	Ranakot	263	99	17.00	
Point	212	Dhoul dhar	Ranakot	49	20	17.00	
Point	61	Pokhari	Bhaitan	61	31	18.00	
Point	47	Tachhla	Bhaitan	176	93	18.00	
Point	148	Falsiri	Man gaon	385	179	19.00	
Point	152	Dadreli	Man gaon	294	111	25.00	
Point	109	Talai lambadi	Timli	107	31	30.00	
Point	168	Pendars	Man gaon	185	88	34.00	
Point	193	Bhutali	Ranakot	153	56	35.00	
Point	164	Payal gaon	Man gaon	214	57	36.00	
Point	213	Sera	Ranakot	39	9	37.00	
Point	160	Man gaon	Man gaon	264	100	38.00	
Point	156	Kandari gaon	Man gaon	99	20	39.00	
Point	197	Kothi malli tali	Ranakot	300	68	40.00	
Point	145	Purwala	Bugala	255	85	40.00	
Point	118	Jamola	Bairai Gaon	304	68	40.00	
Point	17	Salam Khet	Ampata	4	1	40.00	
Point	208	Maroda	Ranakot	124	44	40.00	
Point	176	Khola	Man gaon	81	28	42.00	
Point	112	Pungarh	Timli	45	3	42.00	
Point	167	Fafruwan gaon	Man gaon	32	8	42.00	
Point	102	Kuee	Timli	104	16	43.00	
Point	157	Palogi	Man gaon	111	49	43.00	
Point	188	Saud	Ranakot	186	33	43.00	
Point	169	Adali	Man gaon	111	42	44.00	
Point	100	Ghughtiyani talli	Timli	177	78	44.00	
Point	90	Khakhoor	Banali	165	34	46.00	
Point	96	Ghughtiyani malli	Timli	112	61	46.00	
Point	94	Barkoat	Timli	69	38	48.00	


Local Market
Narendra Nagar Block
Towns
Village
Railway line
Roads
Rivers
River
Streams
Distt boundary
Block boundary
Pachayat boundary
Market
0 - 1 km
1.1 - 2 km
2.1 - 4 km
> 4.1 km
Forest
N
W
E
S
Nagani
Gaja
Jajal
Fakot
Agrakhal
Duwadhar
Narendra nagar
Muni ki reti
Brahmpuri
Rishikesh
Gular
Devprayag
Bhuin
Sour
10
0
10
20 Kilometers

9.1. GUIDELINES FOR PREPARATION OF DATABASE

The study experience of this thesis project enables us to derive some useful guidelines for using GIS in sub-regional planning particular in rural hill region. These are categories in two sections as given blow.

1. For grass root level planning, data related to existing development schemes/ programmes, social and physical infrastructure facilities and demographic statistical of each village should be collected by village panchayat development officer in document (report) form in order to have a GIS based attribute database. The contents of the document should cover the following:

    - Population
    - No. of households
    - Population and households below poverty line.
    - Literacy rate
    - Details of each government scheme/ programme launched for rural development.
    - Distance-wise availability of facilities at village level.

2. Above data should be collected yearly and old database be updated to monitor the development progress and to prepare a development plan for future.
3. The initial task for involving GIS in decision making is to prepare digital spatial database. In addition to this, maps of villages coming under community development block should be digitized. These maps should have location of village (settlements), village boundary, nyay panchayat boundary, metalled roads, unmetalled roads, pathways, rivers, streams, towns, railway lines.
4. To complete the above task, GIS expert should be employed in all community development blocks who will prepare GIS based planning maps and link all the non-spatial data with spatial data of all the villages of C D block and update this data yearly to monitor the development and also prepare a separate attribute database of block as a whole.

5. Similarly, at district level there should be **GIS planning lab** having a rural planner and a GIS expert to take care of GIS based planning programmes. They should work under (NIC) district informatics centre as NIC is responsible for all the work related to collection, compilation and distribution of information.
6. The responsibility of district level GIS expert, firstly, is to prepare digital planning maps in GIS environment including block boundaries, district boundary, metalled and unmetalled roads, pathways, rivers, streams, towns, railway lines. Secondly, to link the Non-spatial data of block, prepared by block level GIS expert and planning map of the district with the help of GIS softwares. Thirdly, to prepare a non-spatial database of district as a whole for state level decision making.
7. Final task in this direction is to prepare a state level GIS planning database. To fulfill this aim, there should a GIS planning lab in state district informatics centre. The GIS expert appointed in NIC should prepare a state planning map with the same contents as district planning map and link the non-spatial data obtained from district planning lab with spatial planning maps so that these data can be utilized in decision making.

The entire sequence of operations mentioned above within the administrative hierarchical setup is shown in figure 9.1

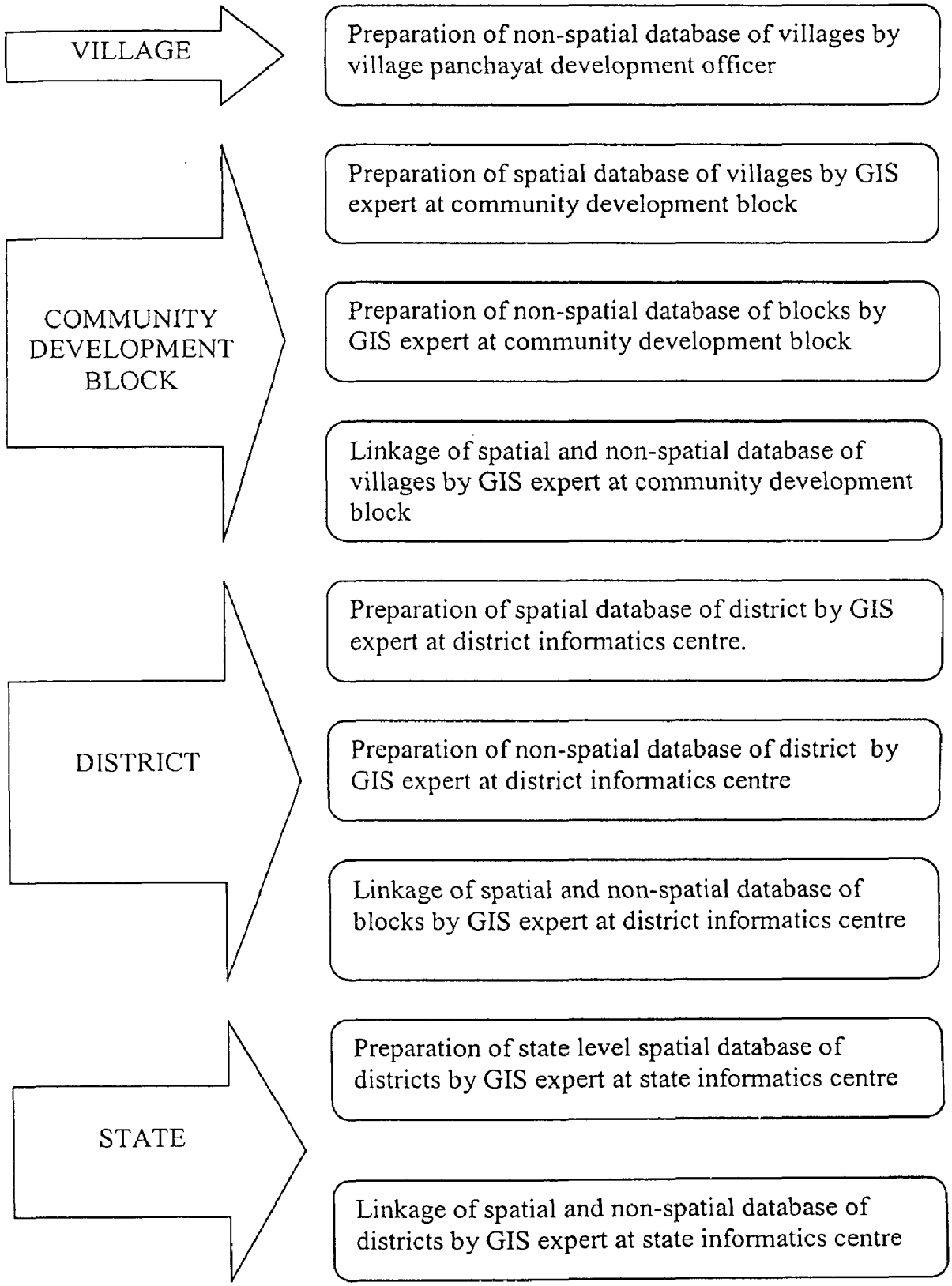


Figure 9.1: Hierarchy of administrative levels and operations in management of environmental database for rural/ regional planning.

9.2. GUIDELINES FOR APPLICATION OF DATABASE

1. village level GIS based planning data should be available to concerning village panchayat to identify the problems of the village and to review the development programmes/schemes and facilities and further to prepare a draft development plan of the gram panchayat with the help of available mapped data prepared in GIS environment
2. As mentioned in panchayati raj act after 73rd amendment, there shall be 6 committees; planning and development committee, water management committee, construction work committee, health and welfare committee, education committee and administrative committee at each level i.e. gram, kshetra and zila panchayat. These committees take care of their duties but in present, they do not have appropriate database which is very much essential for the decision making. GIS based specially referenced data will be of much help, so they also should have this database.
3. Block level information based on GIS should be available in each community development block so that they can monitor the implementation of the funds provided for the development programmes and based on results obtained from the analysis to prepare a draft development programme for the whole block. These plans should be made available to district for granting the funds for future development.
4. District level GIS based database should be made available to zila panchayat, which deals with district development schemes so that they can monitor the development schemes/programmes and based on results obtained from the analysis and incorporating block development plans prepared at block level, prepare a draft development programme for the whole district.
5. District rural development plan prepared by the zila panchayat and district urban development plan prepared by the municipal corporation/ municipality should be made available to district planning committee to prepare a final development plan for a district.
6. Financial issues related to development plan are dealt by the rural development agency (DRDA) so block level GIS based development plan and district level GIS based development plan should be made available to DRDA so that agency can monitor efficiently the implementation of the programmes and identify the problematic villages

and according to fund available, agency can prioritize problematic villages and distribute the available funds in proportions as required.

7. GIS based planning database should also be provided to NGOs working at block and district level so that they can contribute in the development process.
8. District lead bank should also have this database because all the funds from the central and state government are dealt by them.
9. State level GIS based database should be available to finance the commission to distribute the funds to district in such a manner so that the integrated development can be achieved.
10. State planning commission should also have district level GIS based database to monitor the facilities available and to provide facilities in such a manner so that all the districts can grow uniformly.

The hierarchical setup and inter-linkings between the components of entire planning machinery involved in database management and application of GIS in rural planning is shown in figure 9.2

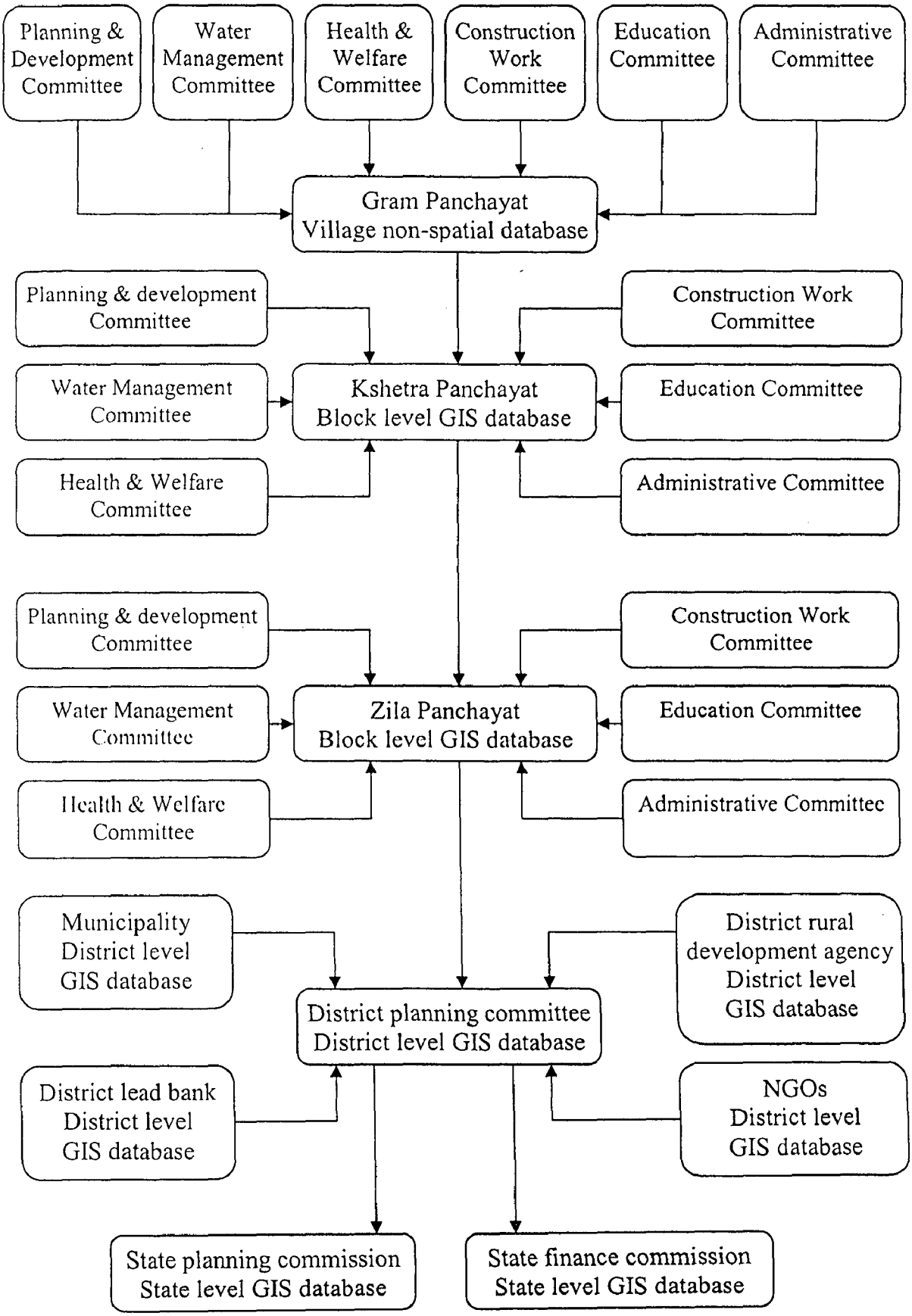


Figure 9.2: Flow chart showing organizational network of planning machinery involved in database management and application of GIS in rural planning.

Human response to natural resources is affected by the social-economic structure of the communities concerned. The problems related to conservation and rational utilization of resources should be examined in this light taking district as a unit. District level planning implies evolving a developmental scenario consistent with the specific needs of the people, the growth potentials of the area and the budgetary allocations available. The task is of bringing about an effective functional linkage and coordination among various agencies for optimum resource utilization. To be effective, comprehensive studies of individual resources and evaluation must be correlated, analyzed and integrated by developmental agencies.

In decision planning process, one of the main causes is absence of accurate digital data in the form of maps. The data generated by various state government departments such as Education, Health, PWD etc. are enormous but poorly maintained, and particularly the spatial data shows the maximum inaccuracy.

GIS has the capability of integrating the data from various sources, spatial and non-spatial. It can play an important role in evolving alternate scenarios for resource development and management. We have abundance of data with the district agencies. However, not much of this data is properly analyzed and effectively used for plan formulation and implementation. An integrated system is required where all the data is stored in a uniform format of all the departments and used for regular monitoring of projects, analysis and other district planning exercises. GIS based decision making process is right step in this direction and this can be used for any district of the country.

As compare to traditional cartographic Process, GIS decision making process is user-friendly. It enables one to generate complex queries from non-spatial datasets and also display results of it on spatial dataset.

GIS can play an important role in Multi-criteria evaluation which is a process for combining data according to their importance in decision making. Basically GIS provides information to fuel those part of the decision making process which are spatial in nature.

Spatial decision making using GIS can be amplified much more by incorporating Remote Sensing and GPS technology. Also to make it more comprehensive, more and more data from all the government departments where computerization is in progress can be integrated at village / block level.

The planners of district and taluka level like collectors, DDO, TDOS, have gigantic task of planning various national and state level rural development programmes, decide within the qualifying condition of various projects, satisfying the local needs. GIS can be used by these planners in decision making. The cost effective GIS solution at grass root level has been found to be very useful to the planners and decision makers. It has created self-reliance among a large number of people to use Spatial Information Technology for decision-making. Hence, GIS application to Regional planning in decision making is a modest attempt to facilitate the Decision Support System at grass root level.

The ultimate scope of the project can be to create digital databases for the entire district and provide access to the databases and decision support systems of remote places under the web technology framework. With the growth in the technology it is now found feasible to implement web-GIS technology, which would be a cost-effective and most amicable solution for the State Governments.

The newly created state Uttaranchal is rural dominated state having immense potential for developmental activities. For overall development, first we have to concentrate in providing the basic amenities such as health, drinking water, electricity and primary education. GIS can play a great role in decision making for providing these basic facilities. The village and block level maps showing several demographic related data, along with current status of basic amenities (health, education, water, electricity and transportation) will help the state government for better governance. If all or most of the state departments join hands in a combined effort to implement GIS based system, then it will be a big leap towards e-governance for a new state like Uttaranchal.

This study is done taking one district and one block for macro and micro level planning due to short time period and similarly this analysis can be done for whole Uttaranchal State.

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APPENDIX I

THE CONSTITUTION (SEVENTY-THIRD AMENDMENT) ACT, 1992

An Act further to amend the constitution of India Be it enacted by Parliament in the Forty-Third year of the Republic of India as follows:

1. Short title and commencement -This Act may be called the Constitution (Seventy-Third Amendment) Act, 1992.

2. It shall come into force on such date as the Central Government may, by notification it the official gazette, appoint.

3. Insertion of new Part IX: After Part VIII of the Constitution, the following Part shall be inserted namely:

PART IX

THE PANCHAYATS

243. Definitions: In this part unless the context otherwise requires:

(a) "District" means a district in a state.
(b) "Gram Sabha" means a body consisting of persons registered in the electoral rolls relating to a village comprised within the area of Panchayat at the village level;
(c) "Intermediate Level" means a level between the village and district levels specified by the Governor of a state by public notification to be the intermediate level for the purpose of this part;
(d) "Panchayat" means as institution (by whatever name called) of self-government constituted under Article 243-B for the rural areas;
(e) "Panchayat area" means the territorial area of a Panchayat;
(f) "Population" means the population as ascertained at the last preceding census of which the relevant figures have been published;
(g) "Village" means a village specified by the Governor by public notification to be a village for the purpose of this part and includes a group of villages so specified.

243-A Gram Sabha- A Gram Sabha may exercise such powers and perform such functions at the village level as the legislature of a state may, by law provide.

243-B Constitution of Panchayats

(1) There shall be constituted in every state, Panchayats at the village, intermediate and district levels in accordance with the provisions of this Part.

(2) Notwithstanding anything in clause (1), Panchayats at the intermediate level may not be constituted in a State having a population not exceeding twenty lakhs.

243-C Composition of Panchayats

(1) Subject to the provisions of this Part, the Legislature of a State may, by Consequently; the Governments have law, make provisions with respect to the composition of Panchayats;

Provided that the ratio between the population of the territorial area of a Panchayat at any level and the number of seats in such Panchayat to be filled by election shall, so far as practicable, be the same throughout the state.

(2) All the seats in the Panchayat shall be filled by persons chosen by direct election from the territorial constituencies in the Panchayat area and for this purpose, each Panchayat area shall be divided into territorial constituencies in such manner that the ratio between the population of each constituency and the number of seats allotted to it shall, so far as practicable, be the same throughout the Panchayat area.

(3) The Legislature of a State may, by law, provide for the representation:

(a) of the chairpersons of the Panchayats at the village level, in the Panchayats at the intermediate level or, in the case of a State not having Panchayats at the intermediate level, in the Panchayats at the district level;
(b) of the Chairperson of the Panchayats at the intermediate level, in the Panchayats at the district level;

(c) of the members of the house of the People and the members of the Legislative Assembly of the State representing constituencies which comprise wholly or partly a Panchayat area at a level other than the village level, in such Panchayat;

(d) of the members of the Council of States and the members of the legislative Council of the state, where they are registered as electors within:

I. a Panchayat area at the intermediate level, in Panchayat at the intermediate level;

II. a Panchayat at the district level, in Panchayat at the district level.

(4) The chairperson of a Panchayat and other members of a Panchayat whether or not chosen by direct election from territorial constituencies in the Panchayat area shall have the right to vote in the meetings of the Panchayat.

(5) The Chairperson of:

(a) a Panchayat at the village level shall be elected in such manner as the legislature of a State may, by law provide and

(b) a Panchayat at the intermediate level or district level shall be elected by, and from amongst, the elected members thereof.

243-D Reservation of seats:

(1) Seats shall be reserved for

(a) the Scheduled Castes; and

(b) the Scheduled Tribes in every Panchayat and the number of seats reserved shall bear, as nearly as may be, the same proportion to the total number of seats to be filled by direct election in that Panchayat as the population of the Scheduled Castes in that Panchayat area or of the Schedule Tribes in that Panchayat area bears to f total population on that area and such seats may be allowed by rotation to different constituencies in a Panchayat.

(2) Not less than one-third of the total number of seats reserved under clause (i) shall be reserved for women belonging to the Scheduled Castes or, as the case may be, the Scheduled tribes,

(3) Not less than one-third (including the number of seats reserved for women belonging to the Scheduled Castes and the Scheduled Tribes) of the total number of seats to he tilled by direct election in every Panchayat shall be reserved for women and such seats may be allotted by rotation to different constituencies in a Panchayat

(4) The offices of the Chairpersons in the Panchayats at the village or any other level shall be reserved for the Scheduled Castes, the Scheduled Tribes and women is such manner as the legislature of a State may, be law, provide:

Provided that the number of offices of Chairpersons reserved for the Scheduled Castes and the Scheduled Tribes in the Panchayats at each level in any State shall bear, as nearly as may be, the same proportion to the total number of such offices in the Panchayats at each level as the population of the Scheduled Castes in the State or of the Scheduled Tribes in the State bears to the total population of the State.

Provided further that not less than one-third of the total number of offices of Chairpersons in the Panchayats at each level shall be reserved for women

Provided also that the number of offices reserved under this clause shall be allotted by rotation to different Panchayats at each level.

(5) The reservation of seats under clause (1) and (2) arid the reservation of office of Chairpersons (other than the reservation for women) under clause (4) shall cease to have effect on the expiration of the period specified in Article 334.

(6) Nothing in this Part shall prevent the legislature of e State from making any provision for reservation of seats in any Panchayat of offices of Chairpersons in the Panchayat at any level in favor of backward class of citizens.

243-E Duration of Panchayat etc:

(1) Every Panchayat, unless sooner dissolved under any law for the time being in force, shall continue for five year from the date appointed for its first meeting and no longer.

(2) No amendment of any law for the time being in force shall have the effect of causing dissolution of a Panchayat at any level, which is functioning immediately before such amendment, till the expiration of its duration specified in clause (1).

(3) An election a Panchayat to constitute a Panchayat shall be completed-

(a) Before the expiry of its duration specified in clause (1)
(b) Before the expiration of a period of six months from the date of its dissolution:

Provided •that where the remainder of the period for which the dissolved Panchayat would have continued is less than six months, it shall not be necessary to hold any election tinder this clause for constituting the Panchayat.

(4) A Panchayat constituted upon the dissolution of a Panchayat before the expiration of its duration shall continue only for the remainder of the period for which the dissolved Panchayat would have continued under clause (1) had it not bee so dissolved.

243-F Disqualification for membership:

(1) A person shall be disqualified for being chosen as, and for being, a member of a Panchayat:

(a) If he is so disqualified by or under any law for the time being in force for the purposes of election to the legislature of the State concerned:

Provided that no persons shall be disqualified on the ground that he is less than twenty-five years of age, if he has attained the age of twenty- one years.

(b) If he is so disqualified by or under any law made by the legislature of the State.

(2) If any question arises as to whether a member of a Panchayat has become subject to any of the disqualifications mentioned in clause (1), the question shall be referred for the decision of such authority and in such manner as the legislature of State may, by law, provide.

243-G Powers, authority and responsibilities of Panchayats:

Subject to the provisions of the Constitution, the legislature of a State may, by law, endow the Panchayats with such powers and authority as may be necessary to enable them to function as institutions of self- government and such law may contain provisions for the devolution of powers and responsibilities upon Panchayats at the appropriate level, subject to such conditions as may tie specified therein, with respect to-

(a) The preparation of plans for economic development and social justice;
(b) The implementation of schemes for economic development and social justice as may be entrusted to them including those in relation to the matters listed in the Eleventh Schedule.

243-K Elections of the Panchayats:

(1) The superintendence, direction and control of the preparation of electoral rolls for, and the conduct of all elections to the Panchayats shall be vested in State Election Commission consisting of a State Election Commissioner to be appointed by the Governor.

(2) Subject to the provisions of any law made by the legislature of a State, the conditions of service and tenure of office of the State Election Commissioner shall be such as the Governor may by rule determine;

Provided that the State Election Commissioner shall not be removed from his office except in like manner and on the like grounds as a judge of High Court and the conditions of Service of the State Elections Commissioner shall not be varied to his disadvantage after his appointment.

(3) The Governor of a State shall, when so requested by the State Election Commissioner make available to the State Election Commission such staff as may be necessary for the discharge of the functions conferred on the State Election Commission by clause (1).

(4) Subject to the provision of this Constitution, the legislature of a State may, by law, make provisions with respect to all matters relating to, or in-connection with elections to the Panchayats.

243-L Application to Union Territories:

The provisions of this part shall apply to the union territories and shall, in their application to a Union territory, have effect as if the references to the Governor of a State were references to the Administrator of the Union territory appointed under Article 239 and references to the Legislature or the Legislative Assembly of a State were references, in relation to a Union territory having a Legislative Assembly:

Provided that the President may, by public notification, direct that the provisions of this Part shall apply to any Union Territory or part thereof subject to such expectations and modifications as he may specify in the notification.

243-M Part not to apply to certain areas:

(1) Nothing in this Part shall apply to the Scheduled Areas referred to n clause (1), and the tribal a referred to in clause (2), of Article 244.

(2) Nothing in this Part shall apply to -

(a) the States of Nagaland, Meghalaya and Mizoram;
(b) the Hill Area in the State of Manipur for which District Council exist under any law for the time being in force.

(2) Nothing in this Part -

(a) relating to Panchayats as the district level shall apply to the hill areas of the District of Darjeeling in the State of West Bengal for which Darjeeling Gorkha Hill council exists under any law for the time being in force;
(b) shall be construed to affect the functions and powers of the Darjeeling Gorkha Hill Council constituted under such law.

(2) Notwithstanding any thing in this constitution

(a) the Legislature of a State referred to in sub-clauses (a) of clause (2) may by law, extend this Part to that States, except the areas if any referred ft in clause (1), it the Legislative Assembly of that State passes a resolution to that effect by a majority of the total membership of that house and by a majority of not less than two-thirds of the members of that House present and voting;

(b) Parliament may, by law extend the provisions of this Part to the Scheduled Areas and the tribal areas referred to in clause (1) subject to such exceptions and modification as may be specified in such law and no such law shall be an amendment of this Constitutions of the purposes of Article 368.

243-N Continuance of existing laws and Panchayat:

Notwithstanding anything in this Part, any provision of any law related to Panchayats in force in a State immediately before the commencement of the Constitution (Seventy-Third Amendment) Act, 1992, which is inconsistent with the provisions of this Part, shall continue to be in force until amended or replaced by a competent Legislature or other competent authority or until the expiration ST one year from such commencement, whichever is earlier.

Provided that all the Panchayats existing immediately before such commencement shall continue tilt the expiration of their duration, unless sooner dissolved by a resolution passed to that effect by the legislative Assembly of that State or, in the case of a State having a Legislative Council, by each House of the Legislature of that State.

243-O Bar to interference by courts in electoral matters:

Not withstanding anything in this Constitution:

(a) the validity of any law relating to the delimitation of constituencies of the allotment of seats to such constituencies made or purporting to be made under Article 243-K, shall not be called in question in any court;
(b) no election to any Panchayat shall be called in question except by an election petition presented to such authority and in such manner as is provided for by or under any law made by the Legislature of a State.

3. *Amendment of Article 280*:

In clause (3) of Article 280 of the constitution, after sub-clause (b), the following sub-clause shall be inserted, namely:

"(bb) the measures needed to augment the consolidated Fund of a state to supplement the resources of the Panchayats in the State on the basis of the recommendations made by the Finance Commission of the State."

4. Addition of Eleventh Schedule: After the Tenth Schedule to the Constitution, the following Schedule shall be added namely.

ELEVENTH SCHEDULE (Article 243-G)

1. Agriculture, including agricultural extension
2. Land improvement, implementation of land reforms, land consolidated and soil conservation
3. Minor irrigation, water management and watershed development.
4. Animal husbandry, dairying and poultry.
5. Fisheries.
6. Social forestry and farm forestry.
7. Minor forest produce
8. Small-scale industries, including food-processing industries.
9. Khadi, village and cottage industries.
10. Rural housing.
11. Drinking water.
12. Fuel and fodder.
13. Roads, culverts, bridges, ferries, waterways and other means of communication.
14. Rural electrification, including distribution of electricity.
15. Non-conventional energy sources.
16. Poverty alleviation programme.
17. Education, including primary and secondary schools.
18. Technical training and vocational education.
19. Adult and non-formal education.
20. Libraries.
21. Cultural activities.
22. Markets and fairs.
23. Health and sanitation, including hospitals, primary health centers and dispensaries.
24. Family welfare.

25. Women and child development.
26. Social welfare, including welfare of the handicapped and mentally retarded.
27. Welfare of the weaker sections, and in particular, of the Scheduled Castes, and Scheduled Tribes.
28. Public distribution system.
29. Maintenance of community assets."

APPENDIX II

INFORMATION OBTAINED FROM NYAYA PANCHAYAT/ GRAM PANCHAYAT

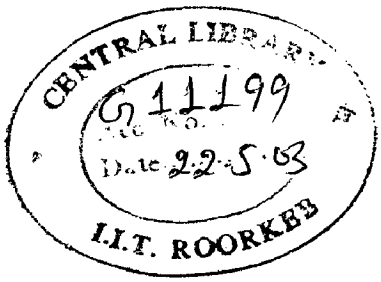
GENERAL INFORMATION

1. Name _____ (NP/GS/village);
2. Name of Pradhan _____
3. No of women members in Panchayat _____
4. No of SC/ST members in the Panchayats _____
5. Altitude _____
6. Area _____
7. Village forest (Yes/No); Area _____
8. Distance of perennial water body;
   River_____ Spring_____ Stream_____ Other_____
9. No. of Households_____
10. No of household electric connections_____
11. No. of unemployed_____ Self employed_____ Others_____
12. Duration of electricity supply _____ Voltage (High / Low / Sufficient);
13. Quality and Quantity of electricity supply (Adequate / Inadequate);
14. Source of water supply (Piped/Bore well/Spring/Stream/River/Other);
15. Distance of water source (Within the village/ 0.5 to 1.0 km/ More than a km);
16. Availability of water supply (Adequate/Inadequate);
17. Availability of fuel wood (Adequate/Inadequate);
18. Availability of fodder (Adequate/Inadequate);
19. No of water taps _____ Duration of supply _____
20. No of telephone connections _____
21. No of biogas plants _____
22. No. of TV _____
23. NO of news papers circulated _____
24. No of household having:
    Solar lantern_____ Solar Cooker_____ Solar water heater_____ Other_____

FACILITIES/ FUNTIONAL UNITS IN THE VILLAGES:

1. Primary health centre/Dispensary (Yes/No);
2. Doctor (Allopathic/Ayurvadic) Yes/No;
3. Police station/Out post (Yes/No);
4. Mahila Mandal/Bal Vatika (Yes/No);
5. NGO (Yes/NO) _____ (Names)
6. Cottage/Household industry (Yes/No);
7. Panchayat/Gram Sabha building (Yes/No);
8. Any Govt office (Yes/No);
9. Market (Yes/No); Distance _____
10. Ration shops (Yes/No); Distance _____
11. Problems of the villages (Land slide/Wild animals/ others);
12. Govt programmes in Operations:

13. No of beneficiaries: _____
14. Most urgent needs of the village



APPENDIX III

INFORMATION OBTAINED FROM BLOCK HEAD QUARTER/ NYAYA PANCHAYAT

1. Names of villages not electrified:

2. Names of villages not having piped water supply

3. Names of villages (not) having telephone facility

4. Names of villages (not) having village forest

5. Names of villages (not) having dispensary/ clinic/ PHC

6. Names of villages (not) having ration shops

7. Names of villages (not) having Mahila Mandal/ Bal Vatika

8. Names of villages (not) having NGO operating

9. Names of villages (not) Panchayat building

10. Names of villages (not) market

11. Names of villages (not) threat of land slide

12. Names of villages (not) having Biogas plant

13. Names of villages (not) having solar lantern/ cooker etc

14. Names of villages (not) having Mahila member in Panchayat

15. Names of villages (not) having cottage/ household industry

16. Names of most developed villages (mention areas)

17. Names of most backward villages (mention areas)

18. villages various govt. schemes/ programmes are being implemented