COMPUTER AIDED POVERTY ANALYSIS AND MAPPING FOR RURAL DEVELOPMENT PLANNING IN NEPAL: A CASE STUDY OF KASKI DISTRICT

by

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A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science

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Abstract

Nepal is predominantly a rural country where severity of poverty is higher in the rural areas. Decentralization act is not much functional due to lack of systematic data, lack of information on poverty-stricken area, and easy and understandable techniques for assessing poverty and development situation.

The research has attempted to examine existing DDC database, its adequacy, its application and further improvement in planning in rural development in Kaski district, Nepal through a series of interaction with local planners, local leaders and personnel. The available numerical data is applied to assess and compare poverty and development situation in all 43 VDCs of the district. VDCs were categorized on the basis of income but it is felt that categorization of VDCs by income alone is not justifiable to predict the poverty situation of VDCs and hence social wellbeing index as a proxy of poverty measure is computed. These two are compared with other sets of composite indices directly or indirectly reflecting poverty to assess overall situation at VDC level. In another effort, a series of maps are prepared using individual and composite indices from GIS, to assess and compare the VDC situations. Statistical techniques are applied to assess the linkages among indicators and their relationship with composite indices.

The finding reveals that income and social wellbeing - an index a proxy of poverty measure have weak relation with other individual and composite indices of development indicators. The indicators such as rural population density, area of VDC with slope greater than 30 degree, distance of VDCs from the district center and distance of VDCs from the road head, road density have high correlation with other poverty and development indicators. Similarly, percentage of thatched roof houses, overall literacy, and percentage of cultivated land has good correlation with the poverty and development.

In the existing database of the DDC, few natural resource data, health related data such as child and maternal mortality, birth rate, and other thematic data are to be integrated for poverty planning. Also, the DDC has to bring consistency in data and uniformity in standardization of data with other organizations. Similarly, poverty situation assessment is to be made not only from income and proxy indices directly reflecting poverty but also from other development related indicators or composite indices constituting sectoral development indicators. Mapping is an effective tool to assess poverty and make visual communication of development situation among VDCs for comparative understanding.

It is recommended that increasing few staff at VDC and keeping VDC database updated, improving amenities of DDC information unit and improving coordination with other data manager help to enhance existing DDC database quality. It is also strongly recommended to follow the methodology used here for Village level poverty analysis in Nepal and other developing countries, with off-course some modification. This methodology is simple, as 0 to 1 scoring transformation technique used here is easier to compute composite indices from indictors with opposite nature by simplified manner, which is demonstrated clearly through this research. The VDC assessment and comparison using mapping technique is also simple and applicable at local levels.

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Abbreviation

ADS	Aggregated Development Sector
AIT	Asian Institute of Technology
BMN	Basic Minimum Needs
BSI	Basic Services Indicators
CBS	Central Bureau Of Statistics
CDO	Chief District Officer
DDC	District Development Committee
Dev.	Development
GIS	Geographic Information System
GO	Government Organization
GSO	General Statistical Office
HDI	Human Development Index
HH	Household
HRD	Human Resource Development
ICIMOD	International Center For Mountain Development
IIS	Infrastructure and Institutional Sector
INGO	International Non-governmental Organization
KM	Kilometer
LDO	Local Development Officer
LGP	Local Governance Project
LRMP	Land Resource Mapping Project
LSMS	Living Standard Measurement Survey
NA	Not Available
NGO	National Planning Commission
NRD-2C	National Rural Development Database
NRDP	National Rural Development Program
NRS	Natural Resources Sector
NTNU	Norwegian University of Science and Technology
PDDP	Participatory District Development Project
PDR	People's Democratic Republic
SMC	Sub-Metropolitan City
SPG	Squared Poverty Gap
SPSS	Statistical Package For Social Scientist
SS	Social Sector
SWI	Social Wellbeing Index
TV	Transformed Value
UNDP	United Nation Development Program
UTM	Universal Transverse Mercator
VLSS	Vietnam Living Standard Survey
WES	Women Empowerment Sector

Chapter 1
Introduction

1.1 Background

Nepal is predominantly a rural country, where almost ninety percent of the population resides in the rural area and majority of them is poor. The HDI value for Nepal for 1999 is 0.463 (UNDP, 2000) indicating low level of human development. The situation in the rural area is severe than the urban areas. People in rural areas are twice more likely to be illiterate than those in Urban areas. The other social indicators such as access to health, education, safe drinking water are significantly lower in rural areas as compared to urban areas (Sharma, 2000).

Various rural development approaches were designed and practiced during last 50 years period especially after the establishment of Planning Commission and onset of democracy in 1949 and 1950 in the country. Among them important approaches are "growth center approach", "area development approach", "integrated development approach", "participatory development approach" and "sustainable rural development approach".

Though substantial improvements are made in the rural development process in Nepal during last 50 years, life of rural people is not much improved as expected. The rugged terrain, its land locked position and poor natural resource endowment are the attributing factors of low level of development of the country.

But, the failure of the rural development can be explained principally in two ways: First, the resources and subsidies leaked to the people whom it was not targeted, second the resources and subsidies did not reach to the most needy people to whom it was designed (Dechman, 1999). This error in the development process is due to lack of information pertaining to the need of people, potential of local area and the gap between these two factors.

Ninth National Plan (1997-2002) highlighted the importance of information needs for planning at the local level. The Plan has also expressed its commitment to improve the information system in the local level for poverty alleviation program in Nepal.

1.2 Statement of the Problem

Under the decentralization act enacted in 1982, District Development Committee (DDC) an intermediate planning body has become responsible for planning and monitoring the development activities in the district. The DDC allocates resources of its own and resources coming from the central government to its constituent Village Development Committees (VDC). Also the DDC is responsible to assign development responsibilities to government organizations (GOs), non-government organizations (NGOs) and donor organizations (DOs) in the district.

Government of Nepal provides Nrs. 500,000 to each VDC each year for development activities in the villages. DDC has to plan and approve development projects

to be implemented from this fund also. The DDC has to select the resource poor area and appropriate program for this purpose as a part of the planing process.

Due to the variation of biophysical condition and geographic location, level of development is different across VDCs. Resource poor villages need additional financial and human resources than those VDCs having better level of development in order to utilize the allocated budget and subsidies to accelerate development.

But the DDC cannot allocate more resources to poorer VDCs as there is no such supporting database to facilitate comparison of VDC in terms of incidence and intensity of poverty. There is no aggregated systematic database for district planning in the DDC though it is said that there is considerable amount of data sets available in the district in sectoral line agencies.

Data analysis is more sophisticated and time taking. Most of the policy makers and elected members have inadequate expertise in the field of planning. So they have difficulty in analyzing the data and they think that quantitative data and information are redundant. They are more confident in their perceptions and judgments (Srisang, 1986 and Yeang, 1998).

The DDC applies participatory approach to solve the problem for resource allocation for development projects. Skepticism towards using mere participatory approach to solve these above-said problems is two-fold. The first, representatives who can speak more and who can give more justification for their programs will pull more resources to their area. Secondly, political party having majority in the district will allocate more resources to its vote pockets. Consequence is that the most needy people are missed out the development program and allocated subsidies. Therefore, participatory approach juxtaposing systematic data and information are need-felt to reach the resources and allocated subsidies to really poor community.

In short, there is no aggregated database for rural development planning, there is no information of poverty-stricken area and there is no quicker, easier and understandable method of data analysis for poverty alleviation planning in the districts of Nepal.

1.3 Rationale of the Study

National Planning Commission (NPC) Report 2000 shows that population below poverty line is 42 percent. Ninth National Plan has emphasized on poverty alleviation and planned to bring down the existing 42 percent population below poverty line to 10 percent in next twenty years. But there is a gap in the basic information on poverty level across the VDCs. To bridge this gap, National Plan has expressed its commitment in developing information system up to the lowest possible geographical unit.

World Bank, Asian Development Bank, United Nation Development Program and other international donor organizations are focusing their efforts for poverty alleviation program in the developing countries. Their poverty analysis is focused more on national level, which reflects the overall situation of the country. These national level indictors give the impression that the situation of the country is uniform. Data collected by these organizations are of high quality, but these data are collected from very few sample households and they are not available for rural development for all VDCs. Therefore, it is

necessary to collect data and information and analyze poverty situation at the smallest level of geographical unit.

Different organizations have attempted to analyze poverty to lower spatial units in Nepal. They have done poverty analysis in different ways taking different indicators. In this context, International Center for Integrated Mountain Development (ICIMOD) has conducted a study to assess development level in the districts of Nepal. This study categorized districts in Nepal on the basis of the performances of development indicators. The study developed its own development indicators. But this kind of study has not gone to the VDC level, which is essential for effective geographical units targeting for development.

Therefore, the study attempted to explore solutions to categorize VDC in the basis of poverty and development level taking a sample district. The study will explore the following issues

1) Is there database in the DDC to assess the poverty and development level of villages?
2) What are the indicators used to categorize VDCs?
3) Do these indicators capture the heterogeneity in terms of bio-physical and socio-economic factors?
4) What is the relation between poverty and development indicators?
5) Is the database analysis easy for all planners to interpret?
6) How effective is poverty-mapping concept to exhibit poverty heterogeneity at VDC level using GIS technology?

Indicators are selected to reflect biophysical and socio-economic condition of VDCs. Existing Database in the DDC is assessed to see the adequacy of data and information.

1.4 Objectives of the Study

The broad objective of the study is to develop a computerized database and information system to support rural poverty analysis and planning in Nepal.

Specific Objectives:

1. To review sources of data and information, types of data and level of availability at district level,
2. To gain views and feedback from local planners about the adequacy and quality of the database and identify the problems, needs and constraints,
3. To establish a spatial database by VDC from the existing database and identify gaps to implement the database for local development planning,
4. To apply the data and information for poverty analysis and mapping at the VDC level using Geographic Information System (GIS) and
5. To recommend for support services for strengthening database and information system at the DDC level.

1.5 Scope and Limitation of the Study

Frame work of the thesis research comprise following points:

1. Poverty issue is multi-dimensional and depends on many factors such as socio-economic, biophysical, natural resources and climatic. Therefore, there are many indicators, which are correlated with poverty. But some indicators are highly significant for development planning at VDC level. These types of indicators are selected for the study.

2. Unit of study is VDC. This study is designed in a way that it is useful for rural development planning. So the Municipalities in the district are not included in the study. The difficulty in undertaking both units is that the characteristics of rural poverty and urban poverty are different.

3. Database is established only for indictors required for the study. Other data are not added, as the data required for different purpose is different and it is impossible to collect and manage them all in this study.

1.6 Conceptual Framework

Poverty is a multi-dimensional concept, comprising the notion of lack of access to resources and opportunities, illiteracy, poor health, and lack of sanitation, deprivation of basic rights and security, and powerless. (Lanjoww, et. al., 1997)

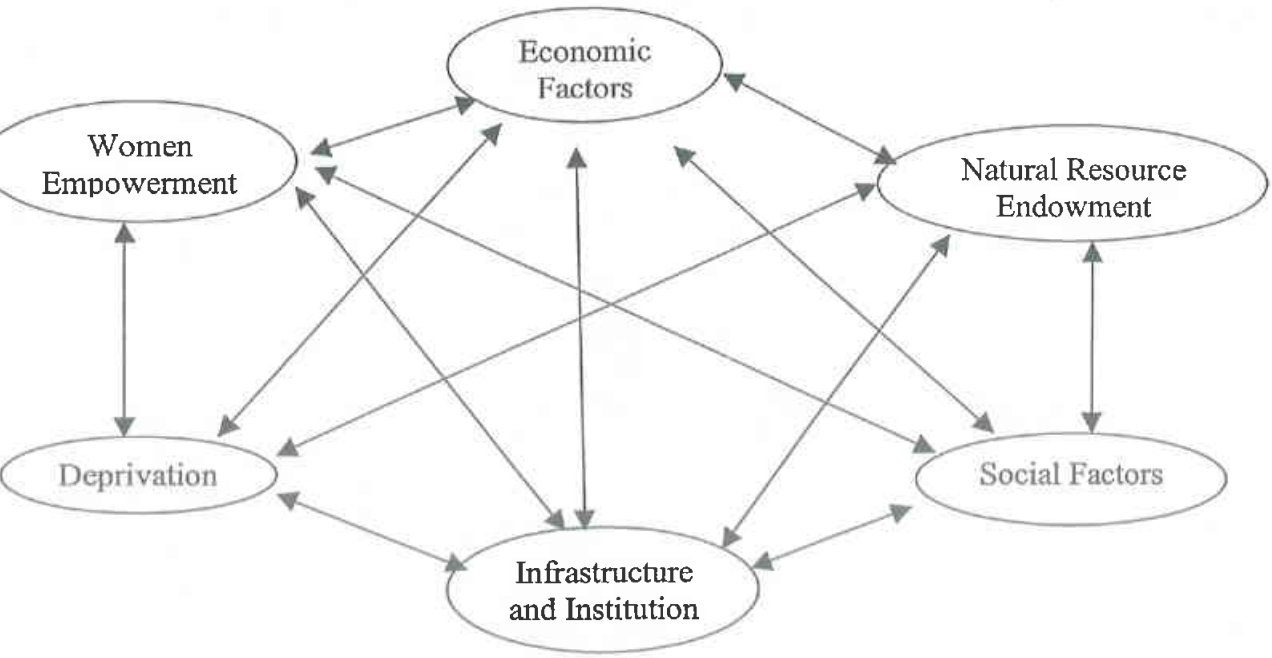
Monetary indictors are considered to be most reliable measures of poverty. Consumption and income are measured to find the absolute poverty. But the social and structural aspects which describe the facet of human well-being cannot be captured by the monetary indicators (Dechman, 1999).

The study is guided from the rural development planning. Therefore, the interest of the study is to see the distribution of natural resources and performances of development indicators in addition to situation of economic situation in rural areas to assess and compare their situation.

In determining the rural poverty indicators, there should be three questions need to be asked: first, are some of these 'explanations' not 'causes' of rural poverty but 'consequences? Second, are some 'underlying' causes, which explain other problems? Third, do the causes of rural poverty lie in the rural sector itself or are they external to it? (Dixon, 1990). The factors governing rural poverty are captured from these philosophies in Figure 1.1. They are interrelated to each other, which is called poverty trap (Chamber, 1990). When one sector is affected the other sector cannot be unaffected. For example when road network is better it enhances the social condition. Likewise, when economic sector is better, other sector are also pulled towards better side.

1. Economic factors
2. Social factors
3. Institution and infrastructure
4. Deprivation
5. Women empowerment

6. Natural resources endowment



Source: Modified to fit for the research on the basis of the works of Chamber, 1990 and Dixon, 1990

Figure 1.2 Aggregate Indicators of Rural Poverty

These aggregate indicators can be grouped into the cause and consequences of poverty. Natural resources are the causes of poverty whereas the infrastructure and institutions may be the consequences of poverty. Similarly some factors are existing in the rural areas and create poverty and some factors are due to the external factors. For example in the Figure 1.2, low percentage of female in decision making body can be the causes of some traditional norms, whereas drinking water system may be due to the unavailability of fund from the external agencies. The Figure 1.2 depicts other factors also. The dis-aggregation of these indicators is done in detail in the literature review part.

Cause of Rural Poverty → Consequence of Poverty A. Indirect ← Causes of Poverty due to External Facto

1. Natural Resources (Distribution and Quality)
- Cultivated land
-Forest land
-Grass land
-Land type
-Population

2. Livestock (Number and Quality)

3. Irrigated land available

1. Gender Disparity
-Low percentage of Literacy
-Low Percentage of Female in non-agriculture business
-Low percentage of female in decision-making body
- High Adult gender imbalance
- High Maternal Mortality

2. Child
-Higher no of child labor
-Low child literacy rate
-High Child Mortality
-Low percentage of Girls in the school
-High Child dropout in the school

3. High Morbidity Rate

4. Low Literacy Rate

5. Poor Housing

6. Food Deficiency round the year

7. Discrepancy in Scheduled Caste and

2. Direct

1. Low Income
2. Low rate of Employment
3. Low rate of Entrepreneurship

1. Services
-Drinking Water supply coverage.
- Coverage of Electricity
- Road Network
- Telephone service availability

2. Service Sub-centers
-Post Office
- Agriculture Center
- Cooperatives
- Health posts
- Schools
- Bank
- Forest Range Post

3. Employment Rate

Formulated on the Basis of the Works of Dixon, 1990, Routray, 1997, ICIMOD, 1997, World Bank, 2000 for this Research

Figure 1.2 Cause and Consequences of Rural Poverty

Chapter 2
Literature Review

This chapter describes poverty and development related terms, poverty mapping, basics of GIS, poverty measuring methodologies, and poverty measurement techniques applied in the Asia Pacific Region such as Cambodia, Laos, Thailand and Vietnam and other part such as in Ecuador and Nepal. The chapter includes few previous thesis and their findings also. Based on these literatures, final selection of the indicators have been made and the linkages of these indicators with prevailing poverty in Nepal and other developing countries have been shown.

2.1 Terms and Concepts

2.1.1 Poverty

There is no universally agreed upon definition of poverty. Different people and organizations have defined it in different way for different places. United Nations Development Program (UNDP) defines it as "People are considered poor when they cannot secure a minimum standard of well being and when their choices and opportunities for a tolerable life are denied or severely restricted (1997).

2.1.2 Headcount Index or Poverty incidence

This measure represents the percentage of population, which has an annual per capita consumption level below the poverty line that is the incidence of poverty. It interprets how many people are poor in the country, but it is indifferent as to whether poor have consumption level just below the poverty line or whether they lie far below the poverty line. (WB, 1999)

2.1.3 Poverty Gap

It reflects the distance between the consumption level of the poor and the poverty line; the greater the distance the higher will be the Poverty Gap. (WB, 1999)

2.1.4 Squared Poverty Gap

It is similar to the Poverty Gap, but differs in that it applies an increasing weight to greater distance below the poverty line. The Squared Poverty Gap is thus particularly sensitive to the severity of poverty. (WB, 1999)

2.1.5 Poverty Line

It is an indicator for reflecting the order of magnitude, its spatial distribution and trends to serve as a rough and ready reckoner for allocation of resources. (Hiten, 1990). Within the poverty line there are varying degree and depths of degradation. For example destitute, the very very poor, the very poor and the poor in terms of their annual incomes (IRDP-India, 1990). There are two poverty lines: Absolute Poverty Line and Relative Poverty Line.

2.1.6 Vulnerability

Vulnerability is the susceptibility of an individual, household or community to external shocks and fluctuation. External factors of vulnerability can be grouped into five categories by major risk factors (Chamber, 1990 and Heninger, 1999):

1. Environmental risk (drought, floods, and pest)
2. Market risk (price fluctuation, wage variability and unemployment)
3. Political risk (change in subsidies or prices, income transfers and civil strife)
4. Social risk (reduction in community support and entitlements)
5. Health risk (exposure to diseases that prevent work)

2.1.7 Deprivation

Deprived households are those, which are poor, physically weak, isolated, vulnerable and powerless. All these factors are inter-related. They enforce each other in producing and maintaining deprivation. This situation is called deprivation trap (Chamber, 1993).

2.1.8 Rural Development Planning

Rural development is conceived as a strategy design to improve the socio-economic life of the rural poor. It involves extending the benefits of development to the poorest in the rural areas e.g. smallest farmers, tenants, landless and other disadvantaged groups (World Bank, 1975). Since the prime objective of rural development is to reduce poverty, rural development program must be designed to increase production, raise productivity, promote human resource development and expand employment opportunities. Moreover, development process must not sacrifice the environmental basis of sustainability.

The objectives of development planning in any welfare state, by definition, would be to maximize the socio-economic welfare of the people. Many approaches were formulated for Rural Development Planning. But the approaches for Rural Development at recent past can be described under three categories (Tripathi and Thapliyal, 1981).

First is the Growth Center Approach. The basic ideology behind this approach is that the process of development in rural areas can be fostered by increasing resource mobility for which infrastructure development is a prerequisite. The main foundation of this approach was location theories (Galpin, 1915) and central place theory (Christaller, 1993). The concept ignored the potentialities of the local economic forces and emphasized induced growth. This approach did not consider the future trends of repolarization of socio-economic activities taking place in an area. (Thapaliyal, 1970).

Second approach is Area Development Approach. This approach is an addition to the growth center approach and takes into account the local factors of economic growth. Thus the rural growth centers provide ideal locations for the provision of infrastructural facilities, their hinterlands were regarded as a basic planning units for integrated multi-sectoral planning to achieve integrated development of an area. This approach therefore, was able to provide a wider framework for rural development (Sen and Thaha, 1976). Here also there is no certainty that 'spread effect' of development affect the whole society with uniformity in the developing countries mainly because of two reasons: people have

unequal accessibility to land and agriculture and allied activities could not absorb all rural labor force available in the rural area.

Third approach is Integrated Rural Development Approach. In this approach, the problem in area development approach and the government policy to tackle the problem of rural poverty, a new strategy of rural development, "target group approach' has been incorporated in the area development planning framework (Tripathi et. al., 1979). Therefore, this approach include three-dimension- first, growth center approach, second the area development approach and third the target group approach.

Similarly, participatory rural development approach was brought in mid 1980s whose key theme was to extract participation of local people for their development. The idea was generated as the development works planned and implemented by the outsiders were evaluated as not much successful. In mid 1990s another approach called sustainable rural development approach was brought whose theme was people's participation for the local development and environmental protection of their area by their own (Chamber, 1990, and NPC, 2000).

2.1.9 Poverty Map and its Importance

Poverty maps provide information about spatial distribution of inequality and poverty within a country. Heninger (1999) and Dechman (1999) state the importance of poverty maps as follows:

National level indictors cannot give heterogeneity that exists across the spatial units within a country, region or even smaller units. As we map indicators for higher resolution administration unit, geographical variability that was hidden in the aggregate data becomes apparent.

The detailed information about distribution of poor enables us to investigate the influencing factors of poverty, whether they are agro-ecological resources endowment, access to input and output market, availability of educational and health facility etc.

Once most needy areas are identified, intervention schemes and subsidy allocations can be designed targeting to needs of the really poor people. This helps to minimize the leakage of transfer of payments to non-poor persons and minimize the risk that a poor person will be missed by poverty alleviation program.

Maps have an important role in communication in inequality with a country or a region or district. Non-specialist audience can read maps. So relevant information gathered at the local level and presented in the form of map reveals the fact of their place to the local people. Local stakeholders with these facts can negotiate with government agencies. Poverty maps thus help empowerment and decentralization.

2.2 Basics and Management Concept of GIS

GIS is defined as an information system that is used to input, store, retrieve, manipulate, analyze and output geographically referenced data or geo-spatial data in order to support decision making for planning, and management of land use, natural resources, environment, transportation, urban facilities and other administrative records.

The key components of GIS are a computer, geo-spatial data and user. The sources of geo-spatial data are digitized maps aerial photographs, satellite image, statistical table and other related documents.

Geo-spatial data are classified into graphic data (or called geometric data) and attributes (or called thematic data). Graphic data has three elements: points (nodes), line (arc) and area (polygon) in either vector or raster form, which represents geometry of topology, size, shape, position and orientation.

Aronoff (1989) defines GIS as a computer based system that provides the following four sets of capabilities to handle geo-referenced data:

2.2.1 Data Input

The function of data input is to convert data from their existing form into one that can be used by GIS. Geo-referenced data are commonly provided as paper maps, table of attributes, electronic files of maps and associated attributes data, Arial photos and satellite imagery.

2.2.2 Data Management (Data storage and retrieval)

The data management component of GIS includes those functions needed to store and retrieve data from the database. There are varieties of methods used to organize the data into computer readable files. Data, database and file structures can determine retrieval and operations speed.

2.2.3 Data Manipulation and Analysis

The data manipulation and analysis functions determine the information that can be generated by GIS. It involves the transformation needed to remove errors from the data or to update them and also the analysis method that can be applied to the data according to the user's needs.

2.2.4 Output

This component concerns the way the data are displayed and the results of analysis are reported to the users. Report may be the form of maps, tables, computer compatible maps or hard copy output drawn on a printer or plotter.

2.2.5 Benefits of GIS Use

1. Geo-spatial data are better maintained in a standard form.
2. Revision and updating are easier.
3. Geo-spatial data and information are easier to search, analyze and represent.
4. More value added product.
5. Geo-spatial data can be shared and exchanged freely.
6. Better decisions can be made.

GIS is important tool in decision making for rural and regional development planning also.

2.2.6 Map Digitization

Digitization is the process of converting the features on a paper map into digital format. The x and y coordinates of the digitized features are automatically recorded and stored as spatial data.

2.3 Previous Thesis

The present research is somewhat typical in its kind. Similar kind of Thesis research in the rural development planning could not be found. Two studies are conducted on database and information system, which are relevant to this research and their findings are presented here. Those studies were undertaken by Yeang (1998) and Kaojarern (1986) separately in Thailand.

Yeang (1998) study focuses on information system and information use of local government in rural areas of Thailand. He selected two districts, one as model and another as control case. In his study he states that the computer and communication technology has been developed in the world but still the information system and information in the rural area is in the primitive stage. Decentralization demands good information system in the local level to assess the effectiveness of decentralized governance. Some Tambon Administrative Organizations (TAOs) have gradually been forming prototypes of self-government, although they are still far from having full-fledged autonomy. TAO members acquire gradually the capacity to conduct the new institutional processes through learning and practicing. TAO staffs are also increasing their management and administration skills. But some TAOs are still in the elementary stage of adapting and learning. In the TAOs, a considerable amount of information is available but local governments rarely use it. Local people are confident about their judgement and perceptions of local conditions and thus consider the quantitative indicators redundant. They fail to recognize the possibility that such data can be used complementary to perception. In addition, the data format and indicators are designed for central purposes and are not particularly useful to local governments. Most of the information is drawn to TAOs but information is not released about TAOs operation and performance to public which makes local people passive to take interests in database. For national and local level interaction on database, the formats of NRD-2C and BMN should be modify to fit them in local needs. Computer use in the local level to perform information operation faster and use of intranet for information system for rural people for agriculture information are also recommended.

Thailand's National Rural Development Program (NRDP) was set up under the fifth national economic and social development plan (1982-1986). The NRDP attempted to use NRD-2C and BMN database to focus on the problem of poorer rural areas. Kaojarern (1986) studied the impact of NRD-2C database and BMN database, which were recently used by that time. She mentions that impact of these databases on the rural development program could not be evaluated and the database could not be extended through out the whole country by the end of the five-year plan. NRD-2C and BMN assist to identify problems, systematize planning, monitoring and evaluation, which in turn help budget allocation without duplication. However, most of the government officials are not much aware of data base system and data collection method. There is problem in problem prioritization due to lack of knowledge and confidence in NRD-2C. Top-down approach is dominant in budget approval. She recommends that improvements in eliminating the conflict between the BMN and NRD-2C database to avoid confusion among planner are

needed. To clarify how to integrate the two village databases for planning, guidelines should be provided for planners. The dates for survey schedule should be fixed at appropriate dates for sufficient data collection. The collected data should be sent to the provincial level for computer entry.

2.4 Poverty Assessment in Different Countries

2.4.1 Cambodia

Royal Government of Cambodia (RGC) has implemented Scila Program. The Scila program is an initiative to strengthen local governance as a key to achieve sustainable poverty alleviation in Cambodia. The program was started in 1996. This sub-topic is based on the report of Scila program.

A Management Information System (MIS) has been developed to collect, use and store data to assist Scila program in planning, allocating resources, monitoring and evaluation. One component of MIS is database known as 'Commune Database". It is comprehensive database containing basic socio-economic data at village level. The objective of the commune database is to "provide data and input for situation analysis and local development planning, for decision making on the allocation of resources, and for measuring impact of local development activities".

The database covers the following sectors (Appendix1):

1. Population and housing characteristics
2. Literacy and education level
3. Economic characteristics of the population
4. Health services, water and sanitation
5. Agriculture and livestock
6. Local enterprises and employment
7. Seasonal labor migration
8. Community based organization

The database does not include detailed technical data required for secotral department. It does not include special local geographical information also.

The main criteria of selection of the geographic unit for resources allocation are population and poverty. Weighting is given to these two composite indicators. The geographical areas are ranked for poverty according to these criteria:

1. Percentage of female-headed household
2. Percentage of children not attending school
3. Percentage thatched roof or poor housing
4. Percentage of adult illiteracy
5. Percentage returnees and IDPs
6. Percentage of demobilized soldiers
7. Average assets per family (e.g. cattle, equipment, means of transport)

Province Rural Development Committee (PRDC) considers other factors also before making final allocation of resources to the commune. These factors are related to

the funding that commune is getting, ability of commune to raise local contributions and any other special circumstances that are to be taken into consideration.

2.4.2 Ecuador

Ecuador is a poor country where thirty five percent population or three and a half million people lived in poverty in 1994. Additional one and a half million population were vulnerable to poor. Sixty percent of the total poor resided in rural areas. There is great heterogeneity across region and sectors in relationship between poverty and social indicators.

World Bank and The Statistical Institute of Ecuador (INEC) have conducted poverty analysis in Ecuador applying two different methods. World Bank has applied consumption-based measurement for the poverty analysis and the INEC has used services indicators to identify the geographical pockets of poverty. Both methods are described in World Bank working paper 1, "Ecuador Poverty Report 1999".

2.4.2.1 Consumption Based Poverty Measurement

The report says that consumption based Poverty Assessment is more reliable for number of reasons. First, consumption of a household tends to fluctuate much less during the course of a month or even a year than income. The income of the poor is often quite volatile: in the urban centers, the poor frequently depend on jobs as day laborers in the informal sectors. In the rural sector, income from agriculture fluctuates with prices and harvest conditions while income of a household may thus vary during the course of a year, consumption patterns are much more stable. Saving during periods of high income and borrowings, in the period of shortfalls, help smooth the consumption of food and other goods. Hence, poverty analysis based on consumption as the welfare variables is more likely to accurately represent the well being of a population than one based on an income measure.

Secondly, experience shows that consumption data is easier and more accurately collectable. Asking people about their consumption during a fixed recall period is more reliable than asking them about all kinds of earnings and incomes. This is particularly true for agricultural and informal sector activities. Thirdly, it allows the specification of a poverty line from the same data source and the researcher avoids many of the problems of comparability which one encounters when one has to impose a poverty line derived elsewhere.

Living Standard Measurement Survey, which is comparable to Living Standard Measurement Survey conducted in many other countries, was conducted by Servicio Ecuatorian de Capacitacion (SECAP). Around 4500 households in urban and 20,000 households in rural Ecuador were covered in the LSMS. Representative sampling was conducted in two cities Guayaquil and Quito in the country. Similarly, the representative sampling was done in regional level for remaining urban and rural areas. SECAP conducted the LSMS in the short time period between end-June and beginning of September 1994 in order to maximize the comparability of the welfare between households in a inflationary environment.

LSMS collected detailed information on quantity of up to 37 food items, The respective data were quantity, expenditure, price, the quantity unit, frequencies of purchase etc. Using a standard conversion table, calorie equivalents were derived from the observed consumption pattern. The food poverty line indicates what expenditure is needed to acquire a minimum calorie intake per person (2237 kcal per capita) associated with the consumption pattern of those in the second and third quintiles of the expenditure distribution.

Similarly, non-food items have been included in the welfare measurement of household; electricity, transport, durable consumer goods, clothing, miscellaneous purchase, education and services, including also expenditure on prepared food purchased outside the home. These non-food consumptions were imputed to expenditure.

Three most frequently used poverty indicators have been used:. first, the incidence or headcount ratio, second, the depth of poverty (or poverty gap), and third, the severity of poverty.

Poverty line was obtained by determining the average proportion of total consumption, which was spent on non-food items by those members of the population who were in principle just able to meet their calorie needs, if they were to devote their total expenditure to the purchase of food items. The poverty line was then calculated by scaling up the national level food poverty line by that empirically estimated proportion. In order to derive the vulnerability line, average proportion of total consumption, which was spent on non-food items by those members of the population who recorded food expenditure equal to the food poverty line, was determined. Then Vulnerability line was calculated by scaling up the food poverty line by this proportion.

2.4.2.2 Basic Service Indicator and Poverty

The Statistical Institute of Ecuador (INEC) produced a number of maps based on Basic Services Indicators (BSI), which have been used as general poverty maps. The INEC promoted these maps to identify geographical pockets of poverty. It applied the measurement of the census 1990 and developed separate urban and rural poverty maps.

INEC involved seven services indicators namely: electricity, water, garbage disposal, telephone services, sewerage, and hygiene and shower facilities. The data were taken form the census 1990. Each service is assigned a certain number of points according to its availability and type of supply. The weighting used were

1.	Water supply:	Public net 250,	Water truck 50,	Well 25,	Others 0.
2.	Sewerage:	Public net 150,	Septic tank 50	Other tank 25	Non 0.
3.	Electricity:	Available 100,	Not available 0.		
4.	Tel. Service:	Yes 200,	No 0.		
5.	Garbage disposal:	Collected 75,	Others 0.		
6.	Hygiene facility:	Exclusive use 150,	Just use 50,	Latrine 25,	Non 0.
7.	Shower	Yes 75,	No 0.		

Skepticism towards using welfare based poverty measure was very high due to difficulty to price services at a common price for all households. It is also important to see

the relationship between the basic services indicators and household expenditure before using them for poverty measurement. Then only it is commendable that the BSI be improved and used for poverty measurement. The third point is that BSI should not be used to identify individual poor household but identify larger geographic areas.

2.4.3 Lao PDR

In 1986 Lao PDR began the transformation of its economy from a centrally-planned to an open market-based system. One decade on, significant progress has been made. But the rural population has yet to receive adequate social services, whether in communication and transport, education, public health or others. The majority of the rural population follows livelihood system based on the rhythm of nature: most live in poverty and suffer high mortality rates and have a low life expectancy. They mostly engage in subsistence agriculture using traditional tools and techniques. (NRDP, Lao PDR, 1998)

Lao PDR has adopted Focal Site approach to achieve rural development. Focal sites are defined as rural areas in which the government concentrates its development efforts to remove the constraints of poverty from the target populations within the focal sites. (NRDP, Lao PDR, 1998). Thirty-two indicators (Annex 2) have been chosen to identify villages as focal sites, which are grouped into five broad categories.

1. Isolation and poverty
2. Development potential
3. Promotion of settled agriculture to replace slash and burn /consolidated scattered small village.
4. Participation
5. Security

NRDP, Lao PDR says that Provincial Rural Development Committees have used these criteria to select the focal sites in their provinces, but does not discuss about how the criteria are to be used in selecting the focal sites.

2.4.4 Thailand

Thailand's National Rural Development Program uses two databases NRD-2C and Basic Minimum Needs (BMN) to identify the areas, which are in need of special attention in order to overcome problem of rural poverty. NRD-2C aims to guide BMN the planner at different level of planning while BMN aims to get the population involved in examining their own living condition (NRD-2C database and Sriang 1986).

NRD-2C database has 31 indicators, which are covered in six problem groups, namely

1. Infrastructure
2. Promotion, income and employment
3. Public health
4. Water resources
5. Knowledge, education and culture
6. Natural resources and environment

Infrastructure includes 4 indicators, promotion, income and employment has 9 indicators and Public health has 6 indicators. Similarly, Water resources has 3, Knowledge,

education and culture has 6 and Natural resources and environment has 3 indicators. Level of development is distinguished into three categories, namely poor, fair, and good. 1, 2 and 3 scores assigned to poor, fair and good respectively.

Villages are categorized from the following criteria

1. If more than ten among thirty-one indicators are marked by 1, the village condition is backward. It means the problems are concentrated in that particular area to a degree above the countrywide average and need to be developed urgently. (Backward)
2. If more than five and less than ten indicators are marked by 1, the village condition is fair. It means an area or village where degree of problem is symptomatic of the average situation and need to be developed moderately. (Moderate)
3. If less than 5 indicators are marked by 1, the village condition is well and considered as a progressive village. Progressive village signifies that the situation in the village is superior to the situation on an average in the entire country. (Progressive)

The Basic Minimum Needs database consists of 39 indicators. (Annex 3). They are grouped into eight problem groups:

1. Problem related to hygiene and sufficiency of food
2. Problem related to residence with appropriate surrounding
3. Problem related to knowledge and education
4. Problem related to life and asset security
5. Problem related to people participating in developing living and community
6. Problem related to spiritual and moral development
7. Problem related to environmental conservation.

BMN data are assessed through two types of questionnaires: household survey and village survey questionnaires. Gap between targeted and existing status of indicators is analyzed from the information collected this way. Possible solutions are found out. The problems that cannot be solved in the village level are sent to the higher authority, leaving those that can be solved in the village level. Priority is set for the village level problems and included in the plan. After two years evaluation is done to assess the implementation of BMN.

2.4.5 Vietnam

Minot, Nicholas (2000) conducted a study in Vietnam, aiming to develop a method to generate a geographically disaggregated estimates of Poverty by combining survey and census data. Among these two data, Vietnam Living Standard Survey (VLSS) was carried out by the Vietnamese State planning Committee (SPC) and General Statistical Office (GSO). The VLSS used a stratified random sample of 4,800 household including 3,840 rural households and 960 urban households. It collected information on household members, housing, fertility, assets, employment, agriculture production, income and expenditure. Agriculture Census was carried out by GSO in 1994, covering 11.5 million rural households (including non-agriculture households). Information regarding household members, housing, land use, animal ownership and assets were collected. It did not collect information on income and expenditure but collected information likely to be correlated to poverty.

Minot used data from the VLSS to estimate the relationship between poverty and twenty five indicators (including household characteristics and regional dummy variables, (Annex 4) from regression analysis. Average values of these same 25 indictors for each rural district are extracted from the 1994 Agriculture Census and are substituted into the estimated equation to generate district level estimates of the poverty rate. The results were presented in the form of district-level poverty maps using geographic information system (GIS).

From his study, Minot, Nicholas concluded that highly disaggregated maps of the incidence of poverty can be generated by combining household survey data and census data. The approach requires two databases with an overlapping set of household variables. Second, household characteristics are individually, fairly weak predictors of rural poverty. Third, household characteristics are much more accurate in predicting rural poverty when combined using Probit regression analysis. Fourth, the district-level poverty map suggests that rural poverty in Vietnam is strongly associated with distance from cities and coast. Fifth, to maximize the usefulness of census data for poverty analysis, a census should include a wide range of questions on household characteristics that are correlated with income and it should adopt definitions that are consistent with those used in the most recent household budget survey.

2.4.6 Nepal

2.4.6.1 Consumption Based Poverty Analysis

First Poverty assessment was done for Nepal in 1991, from Multi-purpose Household Budget Survey of 1984-85. Central Bureau of Statistics accomplished Nepal Living Standard Measurement Survey (LSMS) from June 1995 and completed in 1996. Based on this survey, poverty assessment was conducted for Nepal.

Calorie consumption per household was computed considering different population group such as men, women, infants, children and adolescents, and their workload such as sedentary, moderate and heavy work. The recommended calorie intake for these groups was taken from The National Institute of Nutrition of Indian Council of Medical Research. The calorie requirement per capita came out to be 2124 kcals per day. This is taken as nutrition poverty line. Thirty-seven food items were identified which were consumed by Nepali households. NLSMS 1996, has provided information on thirty seven food items and various non-specified food items. Using the calorie conversion table, it was calculated that the basket obtained from the NLSMS yielded 1736 kcal per person per day. This figure is somewhat lower than the recommended intake of 2137 kcal per person per day. After finalization of the food basket in quantity terms, it was multiplied by average price prevailing in the Rural Eastern and Central Terai and found out the cost of the food basket. The calculated amount is Rs. 2637 per person per annum.

Food expenditure is a sub-set of total expenditure. So even if some persons could afford to buy the food basket, they should still be considered a poor if they were unable to purchase essential non-food items. To take this point into account, expenditure on non-food items and expenditure on house was essential and added for total poverty line. The final poverty line was calculated to be 4404 per person per annum in real price.

On the basis of poverty line described, the incidence of poverty in the country as a whole is 42 percent. In urban areas the rate is 23 percent while it is 44 percent in the rural areas. About 90 percent of the population resides in the rural areas, it is clear that poverty is overwhelmingly a rural phenomenon.

From the analysis, it is also found out that the mountain region as whole is poorer than the Hills and Terai. From the Headcount Index there is not much difference between Hills and the Terai, although for the other poverty measures the hills comes out poorer.

2.4.6.2 International Center for Integrated Mountain Development, Nepal

Aiming to identify districts that deserve the foremost attention in development assistance, International Center for Integrated Mountain Development (ICIMOD) conducted a study in Nepal. The study put emphasis on the use of maps to display the various levels of development and other parameter. Seventy-five districts of Nepal are ranked in the form of maps in terms of their level of development performance.

In the study, thirty-nine indicators were chosen to assess the level of performance of each district. These indicators capture various dimensions of socio-economic condition of people, level of development, and availability of natural resources, including major constraints to development. The procedure for selecting these indicators is basically guided by the four strategic objectives of portraying, which were (Annex 5)

1. Poverty and deprivation
2. Socio-economic and infrastructure development
3. Women's empowerment
4. Natural resources' endowment and management.

The study was based on secondary data available at the district level from various sources. National census, national level surveys, Land Resource Mapping Project (LRMP) and Government's different Ministries and Departments were the sources of information.

Geographic Information System was used for analysis. Seventy-five districts were ranked using zero to one scoring transformation, and they were mapped. In each map, the 75 districts are categorized into three groups: worst (all districts with rank 1 to 25). Intermediate (all districts with rank 26 to 50) and best (all districts with rank 51 to 75). Other five sets of composite index maps were also prepared. Finally, 39 values of 39 indicators of each district were superimposed using GIS facility to prepare one composite map.

2.4.6.3 Ninth National Plan (1997-2002) for Poverty Alleviation in Nepal

Based on analysis of Living Standard Survey 1996 of Nepal, Ninth National Plan says that the size of population living below poverty line is 42 percent, where 24.9 percent population is the poor and 17.1 percent is the ultra poor. Population distribution under poverty line is given in the table below.

Table 2.1 Different Areas and percentage of Poor Population, Nepal

	Region-wise Description	Population below the poverty line (in percent)		
		Total	Poor	Ultra-poor
A	According to geographic region			
	Mountain	56.0	29.3	26.7
	Hills	41.0	21.3	19.7
	Terai	42.0	28.7	13.3
B	Urban and rural areas			
	Urban area	23.0	13.2	9.8
	Rural area	44.0	26.4	17.6
C	National average	42.0	24.9	17.1

Source: National Planning Commission, 1998

Higher proportion of poor population lives in mountain, which is 56 percent. This comprises of 29.3 percent poor and 26.7 percent ultra-poor. This ultra poor percentage is much higher than the ultra poor percentage of other two region, namely Hills and Terai. Similarly, 44 percent of the rural population is poor where percentage of ultra poor is 17.6.

Various factors are attributed to higher rate of poverty in Nepal. Some of them are low level of education and health care, unequal distribution of productive resources, worrisome condition of land-less and marginal farmers and their family. In addition, people of the poorer society have low awareness for their development and hence participation in program targeting to poverty alleviation is less

Eighth National Plan focused on these issues and implemented various programs to improve physical infrastructure, access of poor to productive resources, education and training, social extension, population control, employment generation, food security and condition of backward community. A look at the situation till date reveals that poverty alleviation efforts have not been broad, effective and focused on poor and ultra poor. The size of the poor covered by the targeted programs stands minimal compared to the existing size of the poor people. This is because of lack of information at local level on many program run by the government and NGOs.

National Plan aims to bring down the existing 42 percent population below poverty line to 10 percent in next twenty years. In this long-term vision, Ninth Plan emphasizes on economic growth through agriculture and non-agriculture sector, population control, literacy, health care, credit facility, women empowerment, rural electrification etc., which are related to poverty.

2.5 Discussion

2.5.1 Methods of Poverty Measurement

It is observed from different countries experiences that the poverty assessment in developing countries has been done in two ways: one with assistance from World Bank whose focus is more on aggregate national figure of poverty in absolute term. These absolute poverty measures are used for the comparison of countries.

Second, the developing countries have adopted certain basic indicators to assess level of development for geographical targeting. Based on the performances of those indicators, development has been measured and on that basis, smallest geographic units are categorized for poverty alleviation programs. UNDP is supporting for establishing such database and identifying the poor geographical pockets for poverty alleviating programs in some of the developing countries such as Cambodia and Laos,

2.5.1.1 Poverty Measurement

Basically, Poverty is assessed in economic terms. The terms commonly used are Poverty Incidence or Headcount Index, Poverty Gap and Squared Poverty Gap. These three poverty measures are all part of the Foster-Greer-Thorbecke (FGT) class of Poverty measures (Lanjow et.al, 1999). The measures can be represented by

$$P\alpha = \frac{1}{n}\sum(1-(Xi/Z))^{\alpha} \qquad \text{Equation 2.1}$$

Where

Xi = the per capita expenditure for those individuals who are below the poverty line and zero for those above poverty line.
Z = the poverty line
N = the total population and
α = 0 for the Headcount Count Index, 1 for Poverty Gap and 2 for Squared Poverty Gap.

When α is 0, 1, and 2, P_α is P_0, P_1 and P_2 respectively, which indicates Poverty Incidence, Poverty Gap and Squared Poverty Gap.

2.5.1.2 Similarities and Differences in Indicators

This thesis fits with the second type of poverty analysis where VDC of a sample district are to be categorized in terms of poverty and performances of development indicators. This kind of poverty assessment to identify the lowest administrative area is conducted in developing countries such as Lao PDR, Cambodia, Thailand, Ecuador and Nepal.

Poor people in Laos practice shifting cultivation in the rural areas. It is a big concern for environmental protection and stability of farmers for the Government. So shifting cultivation, and other environmental factors related to stability of farmers are focussed in the identification criteria. Security is another concern of Lao PDR.

Cambodia database for Seila Program has fewer indicators. Population and Poverty has been taken as the resource allocation criteria. Other criteria such as previous budget allocation, level of participation, remoteness, ethnic minority, special natural environment etc are considered separately. Integration of these indicators would facilitate better analysis.

Database of Thailand is much more advanced. It has covered all sectors of development, the indicators are measurable and they are updated in every two years.

Specific problems of the country are land ownership and land certificates. These problems are focussed in the database.

Development indicators of ICIMOD are much more guided by the theme of Ninth National Plan of Nepal. It covers many aspects of development required for rural development though it is prepared for district level. GIS is applied to map the performances of each indicator and aggregated indicators.

From the above experiences of different countries, and on the basis of World Bank's development indicators (2000), ICIMOD district development indicators (1997), Routray (1997), common and useful indicators for the thesis are given in the Figure 2.1 below:

2.5.2 Discussion on the Indicators and Poverty Situation

These broad indicators, their constituent indicators and their relationship with poverty are discussed below.

2.5.2.1 Economic Factors

Three indicators have been taken in this category: Average per capita income, employment percentage and percentage of people involved in entrepreneur-ship. Income consists of agriculture income and non-agriculture income of a household. It is directly related to the low level of literacy, malnutrition, and ill-health. Low-income households have low level of consumption. Employment and entrepreneur lead to the use of the existing stock of capability and to the enhancement of capabilities (NHDR, 1998).

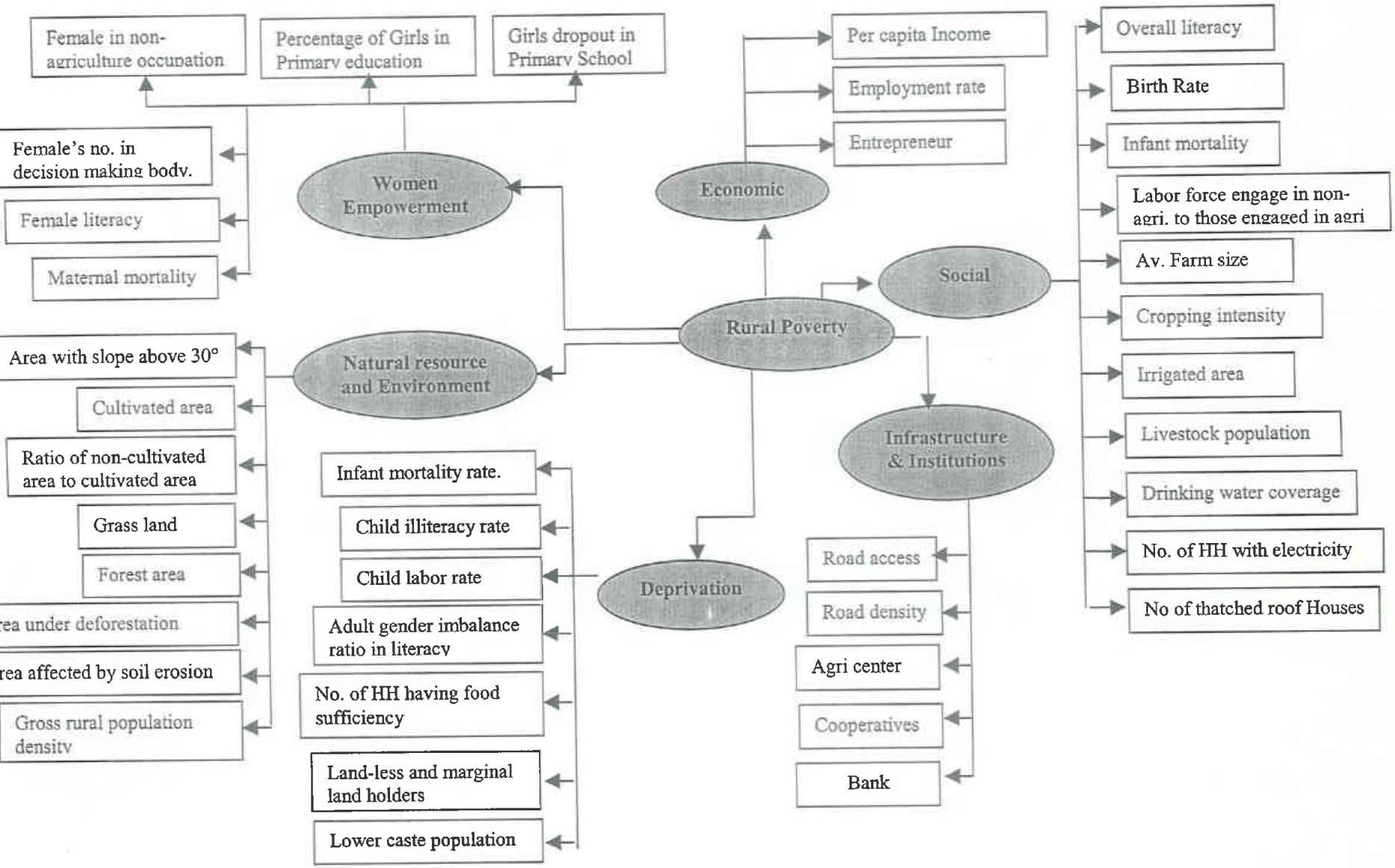
2.5.2.2 Socio-economic Factors

Those indicators, which are consequences of poverty and can measure the welfare of people, were considered as socio-economic indicators. Critical social and health aspect such as literacy rate, infant mortality, average farm size, cropping intensity, irrigated area livestock population, households having electricity, number of houses with thatched roof were taken in this category.

Poverty and socio-economic indicators are related to each other. One way is that the rich might be better able to afford services connections, such as for telephone, electricity or they can move into areas which have good coverage with basic services. On the other hand, several basic services are a prerequisite for a family, which is needed to be healthy and further to earn better income and education (NHDR, 1998, and WB, 2000).

Education and poverty reduction are closely linked. Education increases the productivity of labor, the principal asset of the poor. At the individual level, increased productivity leads to higher incomes. At the macro-economic level, it leads to higher growth rates, which in turn create employment and lead to higher wages. And this virtuous circle can be observed not only in modern economic sectors but also in the rural and informal sectors (NHDR, 1998).

Principal cause of poverty in Nepal is small size of farm. Farmer having farm size less than 0.5 ha and annual average per capita income less than NRs 2500 was considered



Formulated on the Basis of Database of Cambodia, Lao PDR, Thailand, Vietnam, and Works of Routray, 1997,

to be poor. Poverty measurement on the basis of farm size is reliable and relevant (Sharma, 1996).

Land in Nepal is divided into three type: Khet, Bari and Pakho. Khet is flat land, capable of holding water for rice crop and it is irrigation potential. It is high quality land and accounts for the bulk production. The distribution is limited. Therefore, the higher endowment of irrigated area signifies the better status of the people.

Concrete roof, Corrugated Galvanized Iron sheet, clay tiles and stone roof are preferred in all region of the country. Poor people can afford straw for roofing and hence the thatched roof signifies house of poor people. Generally, every family has house in the rural areas of Nepal.

Livestock is an integral component of agriculture production in Nepal. It contributes to about thirty percent of average annual farm incomes (Sharma, 1996).

2.5.2.3 Deprivation

Seven indicators have been selected to measure deprivation. Three are related to children: Infant mortality rate, child illiteracy rate, and child labor rate, Lower caste population, land-less and marginal landholders, and number of households having food sufficiency less than three months.

Analysis of census 1991 shows that eleven Terai origin groups namely: Chamar, Dhanuk, Dhusadh, Kewat, Kurmi, Kushwha, Mallah, Mushar, Muslim, Tharu and Yadav are disadvantaged groups. Similarly, Pahadi (mountain) origin groups are Damai, Kami, Sarki and Tamang are educationally disadvantaged. These groups have shown high level of fertility and low level of participation in the white color activities (Chettri 1996). These groups are distributed all over the country. So the higher the number of these groups in VDCs the higher is the poverty.

2.5.2.4 Women Empowerment

Though it is said that women and men are two wheels of a chariot and both should be equally strong to drag the chariot, women are highly discriminated in Nepal. This situation is worst in households where food, clothes and money are scarce. This is true in the case of girl-children also. They are malnourished and have limited access to education and health care. Women have to work more hours per day than that of their male counterparts. "The overall capabilities attainments in human development in Nepal are reduced by one-sixth if disparity in men's and women's capability attainments is taken into account (NHDR, 1998)".

Therefore, to assess the status of women and girl-children six indicators related to education, health care, occupation and their involvement in administrative decision making body were included in this group index. It includes two indicators related to girl child: percentage to girls in primary education and percentage of girls drop out in primary school, and other four indicators related to women: maternal mortality, female in non-agriculture, percentage of female illiterate and female number in administrative decision making body.

2.5.2.5 Natural Resources and Environment

Land distribution, quality of land and supporting arrangement e.g. forest-land for fodder and fuel wood and litter, grass-land for grazing for livestock, constitute elements of agrarian structure. In addition, environmental aspect: the degradation of fertile land due to deforestation and other human encroachment in the natural land is increasing famine in the country. This has been created by high population pressure.

To assess these situations, eight indicators have been included in natural resources and environment. They are areas with slope greater than 30° degree, percentage of cultivated land, percentage of grass land, percentage of forest land, ratio of non-cultivated area to cultivated area, percentage of area affected by soil erosion, percentage of area under deforestation, and gross rural population density.

Values of area with slope greater than 30°, area of grass-land, area of cultivated land and area of forest land were generated from digital data of LRMP and VDC map. The digital map was available in National Planning Commission GIS unit. Forest-land consists of hardwood forest, shrub, combination of coniferous and broad leafed forest and coniferous forest. Similarly, the cultivated area consists of slopping terrace in hill-slope cultivation, valley floor cultivation, level terrace in hill-slope cultivation, cultivation in Tars, alluvial vans & lower foot-slopes, and settlement, urban areas & built-up areas. These categorizations were made by LRMP.

Land having slope 30-60 degree has high water erosion. In this category of land use mechanization is not possible for any kind of agriculture and soil conservation measures. So from soil erosion point of view the land having slope greater than 30 degree is critical. (DSC)

Cultivable land is the source of crop production and determines the income and employment available from crop and horticulture production. The cultivable land comprises of 20% of the total area and unevenly distributed among farmers.

Forest is another natural resource of the country. It covers about 38% of the land area. But the forest cover has been drastically reduced on account of growing population and pressure for arable land, pasture, fuel wood, fodder and farm implements. Forest per unit of cultivation land is 1.48 in middle-mountain, 0.36 in Terai which is critical. It is suggested that sustainable agriculture requires at least 3.5 ha of forest for one ha. of cultivated land (DSC, Nepal)

Basnayat reports that annual rate of soil loss due to depletion of forest, overgrazing and use of marginal land for cultivation is estimated at 20 to 25 tons per ha of land (1995). Soil erosion is minimum in the agro-forestry land. It is two times higher in forest-land and three times higher in barren-land (Bhandary, 1997). So the deforestation and conversion of land to barren land is very risky from soil erosion point of view.

Grazing land is a major source of nutrient supply for livestock raised by farmers. Such land is very important in hills and mountains where small proportion of the total physical area is under cultivation. LRMP estimates total area of untilled land complementing the tilled land above 5.7 million ha.

2.5.2.6 Infrastructure and Institutions

Infrastructure consists of two indicators road access and road density. Road access is measured in terms of hours as the district has road access almost in all villages. Road density was measured from the available digital road map from National Planning Commission GIS unit overlaying digitized VDC map.

Similarly, one component of this group indicator is number of institutions. Institutions included were Bank, post office, Sub-health post, high school, forest range post, and agriculture sub-center. Service centers not only provide services to the people, but their presence increases the transaction of economic activities. The other way round is that where people are capable of affording for the services, these institutes are established there. Therefore, higher the number of service centers, the higher is the living standard of the people.

Chapter 3
Research Design and Methodology

This chapter discusses about the steps followed to conduct this piece of research. It describes the type of research, selection of study area, survey and data collection method, data sources, and analysis methods. Figure 3.1 exhibits the operational steps followed to conduct this thesis research.

3.1 Type of Research

The research is basically descriptive with deductive approach. Research is based on secondary data and most of the required data and information were collected from the DDC and NPC. These data and information are compiled and used to assess and compare the economic, social, infrastructure and institution, natural resources management, women empowerment situation at VDCs level in the district. Based on the result VDCs are further categorized in different groups in poverty level.

However, researcher, academicians and professionals have not devised a single rigorous technique to analyze poverty due to its multi-dimensional and multi-spatial characters. This research uses maps, SPSS, and a few frequently used techniques such as Foster-Greere-Thorbecke formula to analyze poverty and development. The research find outs the relationship between the indicators with poverty. Therefore the research is more analytical and empirical.

3.2 Selection of the Study Area

Nepal is divided into five Development Regions, namely Eastern, Central, Western, Mid Western and Far-western Development Regions. It is further divided into 14 zones and 75 districts.

Kaski district, the regional center of Western Development Region of Nepal has gone through decentralization process enacted in 1982 and experienced various steps of planning and is selected for the Local Self-Governance Program of His Majesty's Government of Nepal. Different donor organization including UNDP's participatory District Development Project (PDDP) are working in the district to enhance the DDC's capability. The PDDP has ranked the district as one of the best in terms of availability of data. This district meets the secondary data requirement for this piece of Research work.

Kaski district is a typical district with greater variation in topography. Altitude varies from 450 m to 8100 m from the mean sea level. Greater ecological diversity is observed in the district. It is interesting to see the relationship between performance of development indicator and the intensity of poverty in such district.

The district is most suitable from accessibility point of view. It is only 200 kilometer away from the capital city. Kaski district has air service from Kathmandu and other remote districts of the Western Region. The district is linked by all weather motor-able road with the capital and other parts of the country.

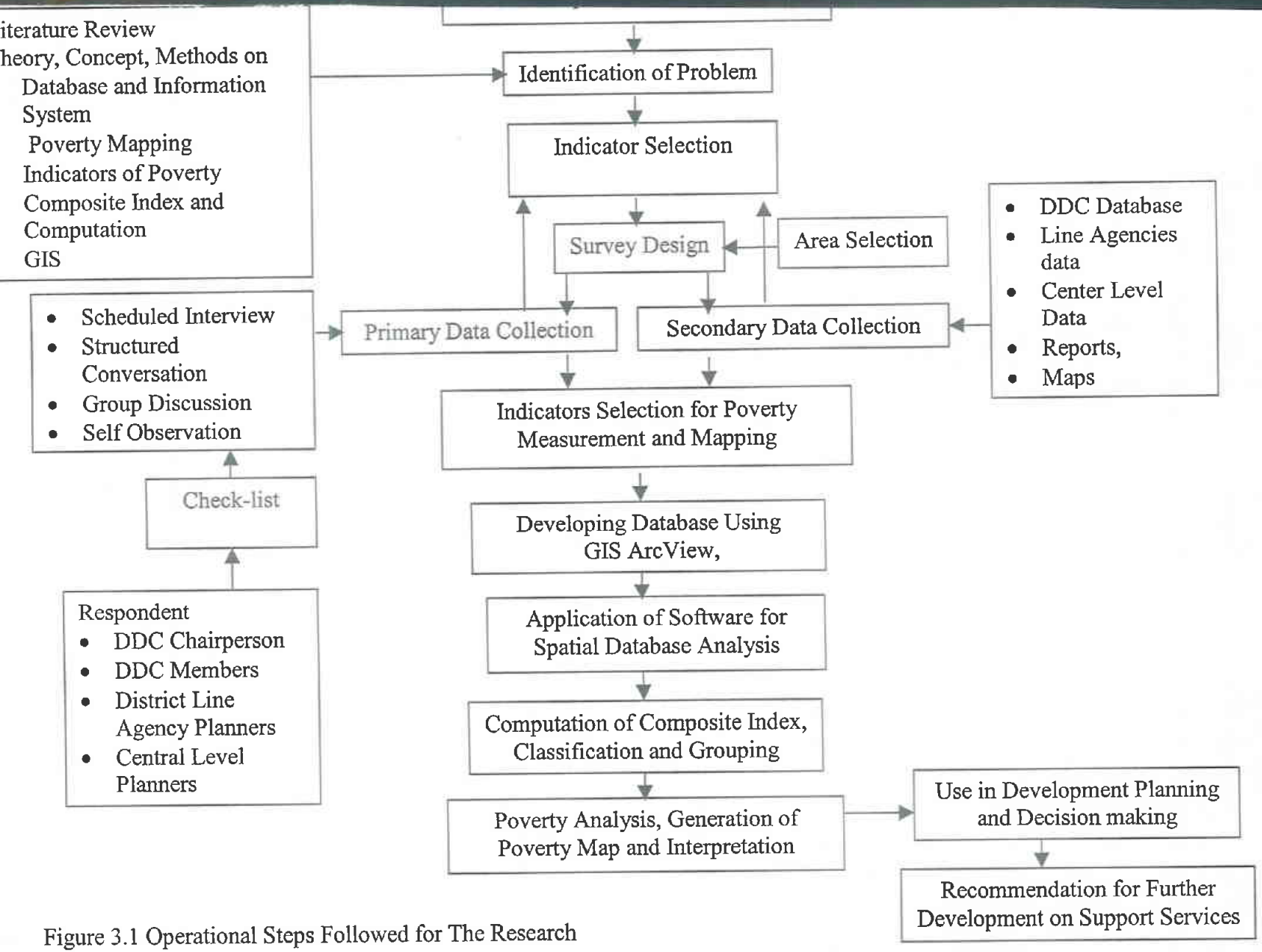


Figure 3.1 Operational Steps Followed for The Research

3.3 Sampling Design

Sampling method used for the research is purposive. Data and Information were collected from specific individuals or groups, who are involved in the district development planning. Therefore, informants for the research are district line agency chiefs, central level planners, district development committee members, and VDC chairpersons.

3.4 Data Source

The study area comprises of 43 VDCs. Disintegrated data and information for these VDCs are not available in a single source as required for the study. Therefore, data and information were collected from various sources. The DDC is the prime source of data. Additionally, NPC GIS Unit, district line agencies and CBS were other sources of data for the study.

Similarly, VDC chairpersons and vice-chairpersons, VDC secretaries and line agencies chiefs were the respondents for the primary data and information of the study. Planners from the central offices in Kathmandu are some other sources for primary data (Table 3.1).

3.5 Data Collection Methods

Data collection method applied in the field is shown in the Figure 3.1.

3.5.1 Primary Data Collection Method

Qualitative information required for the study was collected from the primary sources. Basically three aspect on qualitative information were collected from the field viz. comments and feedback on existing DDC database and VDC database, adequacy and usefulness of database for planning, and further improvements required for database and information management. Sources, respondents and methods used in this process are shown in the Table 3.1.

3.5.1.1 Structured Interview with Central Level Planners

Planners who work in the central planning bodies and interviewed were: Deputy director- Central Bureau of Statistics, Rural Development advisor- ICIMOD, advisor- National Planning Commission GIS unit, GIS specialist - Local Governance program UNDP, district advisor- Participatory District Development Project (PDDP) and planning officer- Ministry of Local Development. The interview was a kind of discussion rather than an interview.

3.5.1.2 Structured Interview with District Level Planners and Policy Makers

Two groups of people were interviewed with this technique. District Development Committee members were in one group and the district line agency personnel were in the another group.

In the first group, five DDC members were interviewed separately with the checklist in the DDC office. During field visit DDC assembly meeting was running, the

members were present in the DDC. In the second group, district line agency chiefs were interviewed in their respective offices. Due to the district assembly meeting some of the targeted district line agency chiefs could not be available for the interview.

Table 3.1 Key informants and Primary Data Collection Method

S.no	Key informant	No. of informants	Methods of data collection and type	Objective
1	Central level planners	6	• Structured interview	• To understand vertical flow of information with DDC. • To get information on improvement needed on existing information mechanism.
2	District level planners	6	• Structured interview	• To understand the view and comment on existing database in DDC. • To understand horizontal flow of information and opinion on it. • To find out the usefulness of database in planning. • To get information on improvement needed on the existing database.
3	DDC members	5	• Structured interview	• To understand the view and comment of the DDC members on the existing database. • To find out the usefulness of database in planning. • To understand the difficulty in planning with existing database. • To get information on improvement needed on the existing database
4	VDC chair-persons	8	• Group discussion	• To collect views and comments on existing database in VDC and DDC. • To find out the usefulness of the database in planning. • To understand the difficulty in planning with existing database. • To get information on improvement needed on the existing database.

Source: Prepared for Field Survey.

3.5.1.3 Group Discussion

This technique was followed to collect information with VDC chairpersons and vice-chairpersons. Local Development Officer (LDO), district information officer, district

planning officer and engineer suggested the suitable chairpersons and vice-chairpersons for the discussion.

Some of the village chairperson who were from the opposition party desired to put their opinion separately.

Group discussion was found to be effective among the chairpersons. They could share the experiences of each other. They discussed the points among themselves and gave the concluding remarks to the researcher. In case of single interviewee, if he was sure about something he stressed those points and other wise he did not like to talk about the point. Another problem faced was the person who liked to talk separately, criticizes the present majority party in the DDC. It was difficult to divert his attention towards the researcher's point. Table 3.1 shows the details of the primary information collection.

3.5.2 Secondary Data Collection Method

Before going to the field, checklist for secondary data was prepared and data and information were collected accordingly. Table 3.2 shows the indicators, sources of data and unit at which data was collected.

DDC collected data from 30 percent household sampling in each VDC. The hard copy of the data of VDC is sold in NRS 20 per VDC.

Land Resource Mapping Project (LRMP, 1978) map and VDC and DDC digital map are purchased from the NPC GIS unit to generate required data for natural resources endowment and environment.

3.6 Data Management

Numerical data for the indicators are entered in Excel, SPSS and ArcView program for different purpose. Most of the computations are done in Excel program. Statistical tests basically, correlation coefficient computations are done in SPSS program. Data entered in ArcView GIS program is used for mapping of indicator value in VDCs. Detail procedure followed in GIS mapping is presented in the Appendix 2.

3.7 Data Analysis

3.7.1 Qualitative Analysis

Descriptive analysis is done from the primary information collected from the field. Quality of data, the use of data in planning in VDC and DDC level, nature of data and level of availability etc. are assessed as planned for the study. This information is used to develop insight for the secondary data analysis, to draw conclusion and to formulate recommendations. However the information found out are described under information systems.

Table 3.2 Indicators and Sources of Secondary Data

S. No.	Broad category	Indicators	Source
1	Economic	1. Average annual per capita income	DDC
		2. Percentage of population employed in secondary and tertiary sector	DDC
		3. Local wage rate	NA
2	Deprivation	4. Child (10-14 yrs) illiteracy rate	NA
		5. Child (10-14 yrs) labor rate	NA
		6. Percentage of Lower cast population	DDC
		7. Percentage of land-less and Marginal farm-household	NA
		8. HH having food deficiency from 3 to 9 monts.	DDC
3	Social	9. Overall literacy rate	DDC
		10. Birth rate	NA
		11. Infant mortality rate	NA
		12. Population having drinking water access	DDC
		13. Ratio of labor force engaged in non-agriculture to those engaged in agriculture	NA
		14. HH Farm size	DDC
		15. Livestock number per farm household	DDC
		16. Cropping intensity	NA
		17. Percentage of irrigated land	DDC
		18. Percentage of thatched roof houses.	DDC
		19. Percentage of household with electricity	DDC
	Infrastructure and Institution	20. Road distance from VDC center to road head in hours	VDC chairs
		21. Road density	Generated
		22. Banking unit for 1000 people	Generated
		23. Cooperatives for 1000 people	Generated
		24. Agriculture center for 1000 people	Generated
4	Women's empowerment	25. Percentage females in Literacy (10 + years)	DDC
		26. Percentage females workers in non agricultural occupation	DDC
		27. Percentage of girls in primary education	DDC
		28. Percentage of girls dropout at primary level (1-5 class)	NA
		29. Maternal mortality rate	NA
5	Natural resource endowment and management	30. Percentage of areas with slopes above 30 degree	Generated
		31. Percentage of forest area	Generated
		32. Area under deforestation.	NA
		33. Area affected by soil erosion	NA
		34. Percentage of grass land area	Generated
		35. Percentage of cultivated area	Generated
		36. Rural population density	Computation

Source: Various Organizations in Column 4 of this Table

Note: 1) Generated means required values are generated from digital data available from NPC, GIS unit LRMP, VDC and DDC
2) NA – not available

3) Computation in the table implies that the data is computed from the available data

4) Abbreviations

DDC	District Development Committee
HH	Household
LRMP	Land Resources' Mapping Project
NPC	National Planning Commission, Geographic Information System unit,
GIS, unit	
VDC	Village Development Committee

3.7.2 Quantitative Analysis

3.7.2.1 Based On Annual Average Per Capita Income

Poverty Incidence, Poverty Gap and Squared Poverty Gap (SPG) are computed from the Foster-Greer-Thorbecke (FGT) class of poverty measures.

Based on Poverty Gap and Squared Poverty Gap, VDCs are divided into four categories: V. poor, Poor, Fair and Good.

3.7.2.2 Scoring and Composite Index Computation

Zero to one scoring transformation method as used by UN to compute Human Development Index (HDI) (http://www.nscb.gov.ph/ru12/TechNotes/HDI.htm#Computation of the Human Development Index) and by ICIMOD to compute District Development (1997) has been used to compute the order of the indicator and composite index.

There are various methods to compute the order of indicators and compute composite index. Researchers, Academicians and Professionals claim that their method are the best (Prabhu and Sarker, 1992 and ICIMOD 1997), but here in this piece of research 0 to 1 scoring transformation method is adopted due to the following reason:

1. All indicator values are changed to 0 to 1 value.
2. Intermediate values are computed with respect to the maximum and minimum value. Therefore, the values can be computed with respect to the desired maximum and minimum. For example, the water supply status can be compared in the district maximum or minimum. If certain value is to be compared with respect to national maximum and minimum it can be done by taking maximum and minimum value from national figure.
3. Two types of indicators having opposite nature can be computed with the same method (explained below) simultaneously.
4. Transformed values (TVs) are unit less value. Therefore, where units of indicators are different and arises computation problem, this method is simple.
5. Especially, the research where giving weight to the indicators for computation of composite index is difficult, it is simple, as it is un-weighted index.

The method transforms the values of the indicators from 0 to 1. Here 0 value shows the poorest condition and 1 shows the best condition of the village for a particular indicator. Therefore higher transformed value exhibits better status of indicator in the VDC.

There are two categories of indicators based on their relation with poverty in the research. First category of indicators is directly proportional to the well being and the second category type of indicators is inversely proportional to the well being. In other words the first category of indicators are inversely proportional to poverty and the second type of indicators are directly proportional to the poverty. For example, average annual household income and number of household having thatched roof. When the average annual income of a VDC is higher the status of the well being of the VDC is better or poverty is less. So it falls in the first category. In contrary, when the number of households having thatched roof is higher in the VDC the status of well being of the VDC is lower and the poverty is higher which is taken in the second category.

In the first case where well being is directly proportional to the indicator,

Transformed Value (TV)

$$= \frac{\textit{Difference between a cell value of one indictor and minimum value the same indicator}}{\textit{Range of that indicator}}$$

i.e.

$$TV = \frac{\textit{Exact value of a cell corresponding to one indicator} - \textit{Minimum value of that indicator}}{\textit{Max. value of the indicator} - \textit{Min. value of the same indicator}}$$

$$= \frac{Xij - Xi(\min)}{Xi(\max) - Xi(\min)}$$

$$= \frac{Z}{R} \qquad \text{Equation 3.1}$$

Here, for a particular indicator denominator is fixed i. e. Xi(max) and Xi(min) are fixed. Only variable is the Xij. When Xij takes the maximum value of the indicator, numerator becomes {Xi(max) – Xi(min)} which is same as the denominator and hence TV becomes 1. In the case when the Xij becomes minimum, the numerator becomes 0. Thus the highest value is transformed to 1 and lowest value is transformed to 0. Similarly the other values are transformed to the range between 0 to 1 without changing the order of the value.

In the case where well being is inversely proportional to the indicator,

Transformed Value (TV)

$$= \frac{\textit{Difference between a cell value of one indictor and maximum value of the same indicator}}{\textit{Range of that indicator}}$$

$$TV = \frac{\textit{Max. value of one indicator} - \textit{Exact value of a cell corresponding to that indicator}}{\textit{Max. value of the indicator} - \textit{Min. value of the same indicator}}$$

$$= \frac{Xi(\max) - Xij}{Xi(\max) - Xi(\min)}$$

$$= \frac{Z'}{R}$$ Equation 3.2

Here also, for a particular indicator denominator is fixed i. e. range between Xi(max) and Xi(min). Only variable is the Xij. When Xij takes the maximum value of the indicator, numerator becomes {Xi(max) – Xi(max)} which is 0. Thus the maximum value becomes zero. When Xi takes the minimum value, the numerator and denominator becomes same and hence becomes 1. Thus the minimum indicator value becomes 1 and maximum indicator value becomes zero. Other values are also changed in the same way without changing its original order.

3.7.2.3 Composite Index

For the purpose of poverty analysis, an attempt has been made to identify some meaningful indicators covering different sectors, such as economic sector, development level, natural resources sector, social sector, infrastructure and institution sector and women empowerment sector, those have direct and indirect relationship with poverty. Composite indices for these group indicators have been computed to understand the development situation and compare perspective of poverty.

Composite index is computed by using the formula as explained below,

$$Cij = \sum_{i=1}^{n} TV \Big/ n$$ Equation 3.3

Where Cij = Composite index of the jth VDC

TVi is unit-less transformed value of ith indicator having numerical value between 1 to 0 and 0 to 1. The two orders 1 to 0 is applied to the indicators where the indicator is directly proportional to the dependent and 0 to 1 is applied to those indicators which is inversely proportional to the dependent.

3.7.2.4 Indicator Interrelationship

All raw data and the computed TVs of the indicators are entered into Statistical Package for Social Science (SPSS) for analysis. Pearson's correlation coefficients are computed to see the relationship between individual indicators and composite indicators.

3.7.2.5 Map Analysis

District map with VDC boundary is digitized in ArcView. VDC level data both raw data and computed data are entered into the software. Maps are prepared for each indicator. VDCs are categorized into four groups in the map: V. poor, Poor, Fair and Good as per the performance of the each indicator and the group indicator separately.

For a map exhibiting income distribution in the VDCs, quartile method is used for grouping. This technique divides total VDCs into 4 equal groups. Therefore, the top ten income holders and bottom ten income holders can be seen. For other indicators, equal interval method is used for grouping. This method gives the idea that how is the distribution of VDCs in certain range of value.

Chapter 4
Profile of the Study Area

This chapter describes the study area, performances of development indicators in the district and division of geographical area for administration purpose. The chapter also describes the planning process in the DDC, vision of the district and the donors working in the district. Planning aspect is emphasized more in the chapter.

4.1 Introduction of the Study Area

Kaski district covers an area of 2017 sq. km. from 83° 40' E to 84° 12'E longitude and 28° 06'N to 28° 36'N latitude in the world map. It slopes down from northern part from Machchachre (6992 m.), Annapurna (8090 m.) and Annapurna II (7937 m.) to the southern part having altitude 450 m mean sea level. Seven other districts surround Kaski district (Figure 4.1, 4.2).

Kaski district is bestowed many beautiful places by nature. Three major lakes: Phewa, Begnas, Rupa and other many minor lakes, beautiful snow-clad mountains, green hills and pleasant climate attract everyone in the world easily. One can have closer look of Himalaya of 8000m sitting at an altitude of 450 m from this district of Nepal. Therefore, it is considered as a well-known tourist place of the country.

The district ranks fifth in development indicators index (ICIMOD, 1997), which signifies that the performances of development indicators in the district is relatively better. Urbanization of the district is around 50 percent, which is much better than that of the national urbanization rate of twelve percent.

Despite that, the population growth rate is 2.81 percent, which is higher than the prevailing growth rate 2.08 percent, of the nation. The literacy is 57 percent, maternal mortality is 73 per thousand births and child mortality rate is 16.4 per 1000 births, even though there are better medical facilities in the district as a regional center of the western development region.

Ecologically, Nepal is divided into three regions: altitude from 4877m to 8848m is categorized as mountain region, altitude from 610m to 4877m is categorized as hills and the area below 610m is categorized as Terai. From this categorization, the area of the district comprises mostly of mountain and hills with fragile geology. The district has rugged terrain whose area with slope greater than 30 degree is 55 percent. In this high sloped area mechanization is not possible, soil erosion due to flow of water is higher and terracing is required for agriculture (Wyatt-smith, 1982). Lifestyle is difficult due to these reasons in the district.

As a well-known tourist place of Nepal, source of income of the district is tourism also. But this is true for the Pokhara sub-metropolis and some other few VDCs. Rest of the VDCs depend on the primary sector occupation. Cultivated land in the district is 489.62 sq. km, which yields an average farm size of 0.79 ha per family in the district level and when only VDCs are taken figure is 0.59 ha per family. But, farm size alone do not give the picture of the well being. Agriculture land with irrigation facility is called Khet in Nepal and considered as a good quality land. The higher value of irrigated area gives the picture

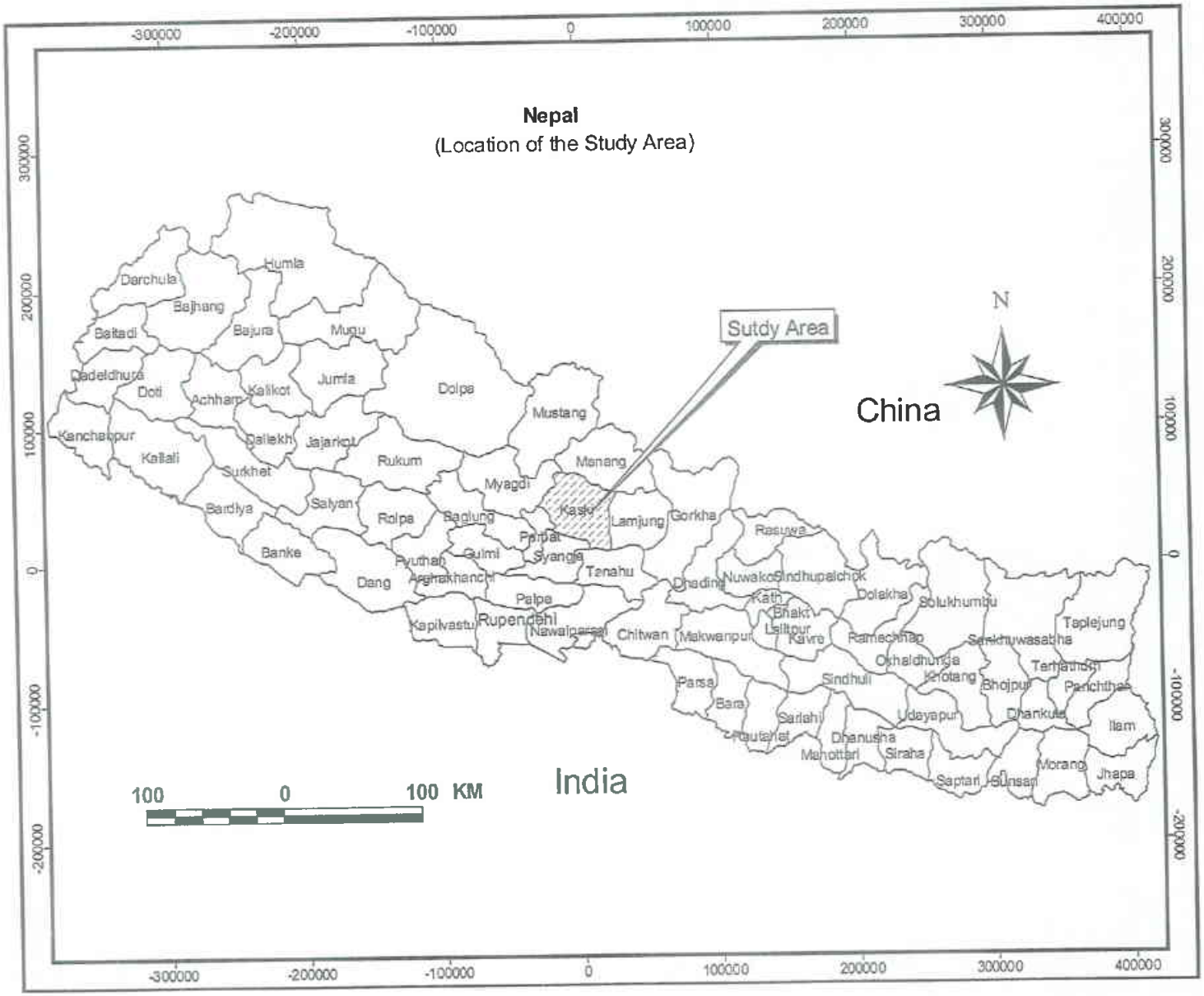


Figure 4.1 Location Map of the Study Area

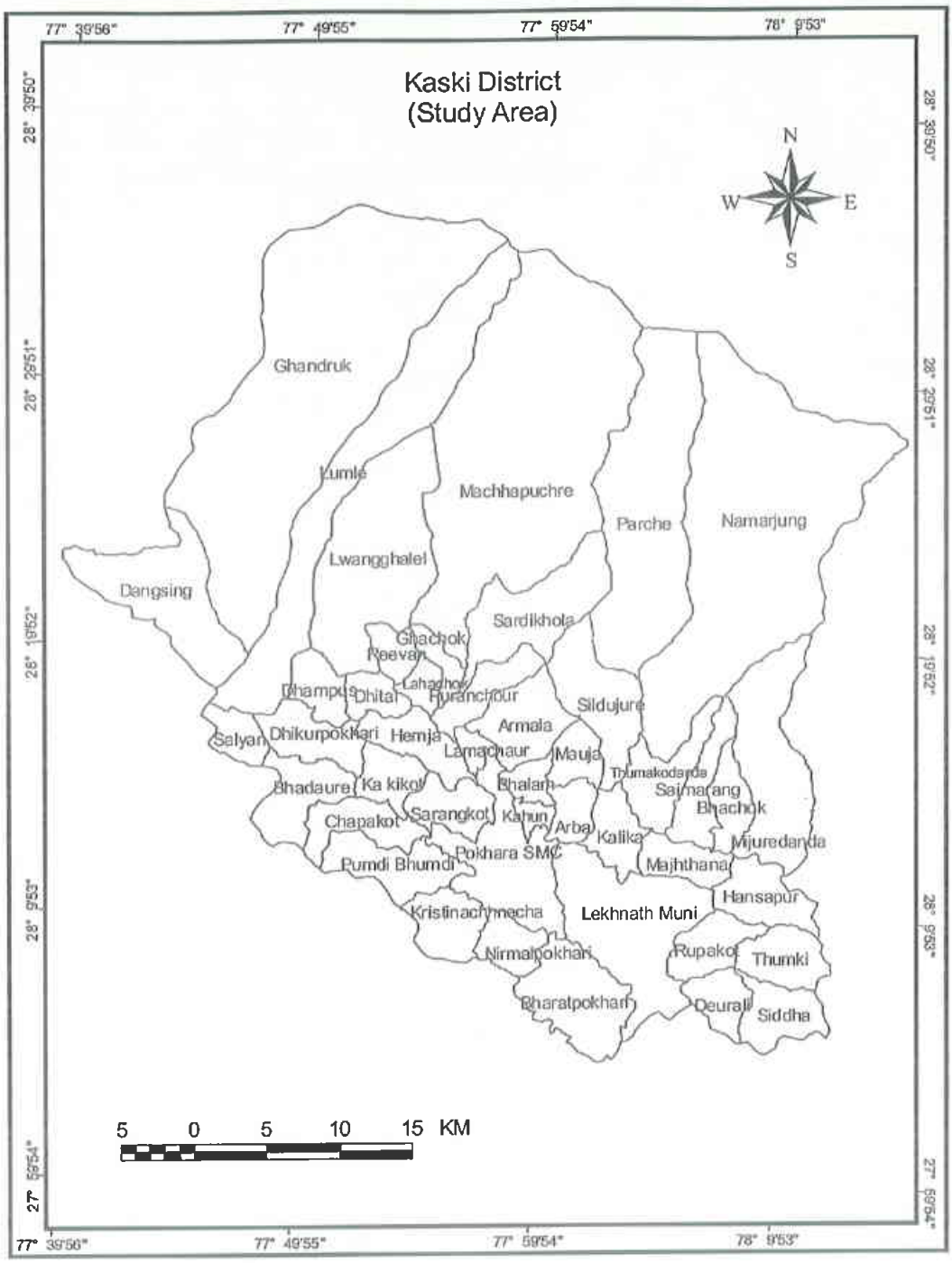


Figure 4.2 Map of the Study Area

of good quality land and hence the better economy. The total area of monsoon irrigated land in the district is 101 sq. km (municipality not included) which comes out to be 54 percent. Seti and Madi are the main rivers of the district. There are small rivers such as Vijayapur, Kotre, Idi, Kali, Sardi, Harpan, Fusre, Kahu. These rivers are potential for irrigation and hydropower generation. The district comprises of 398.94 sq. km of snow, rocky and other land, which is not usable for productive use. The district is not food sufficient, only about 38 percent people have food sufficiency for more than nine months in a year.

Forest is the source of fuel-wood, fodder and litters. Wyatt-smith's study showed that the subsistence agriculture in the hills requires 3.5 ha of forest per hectare of cultivated area. The district has 899.43 square km. forest, which gives an average of around 2 ha forest per one ha of cultivated land. Due to the strategic change in the forest management: by hand-over of forest management to the respective beneficiaries, significant improvement has been seen in the forest status in the recent few years. Total area of 113.54 sq. km forest is handed over to 366 forest-user group. Even then the required coverage of forest is much alarming from the conservation point of view.

Kaski district is 200 km west from the capital city Kathmandu. It is linked to capital city and Terai by high ways. There is daily air service from Kathmandu. As a center of the western development region, there are air services to other remote districts such as Mustang and Manang from here. Within the district, there are 186 km black topped road, 110 km graveled and 145-km earthen road (DDC, 2000).

The district has 326,398 population, which comprises of 164,302 males and 162,096 females. Population density from this population size comes out to be 162 persons per sq. km. When the population is seen caste-wise, 91,249 Brahmin, 55,744 Gurung, 43,148 Chhetri and 136257 others are distributed in the district. The average population per household is 5.3 in the district. The educationally disadvantage population is 17.68 percent here.

The district data showed that the gender discrimination is prominent here. Only 39.55 percent females are literate, high maternal mortality, 20.77 percent of girls drop out from primary school, 24.77 percent of women are in non-agriculture occupation and their presence in the decision making body is minimum which counts 3.44 percent which shows that women are not much empowered.

Alpine, sub-tropical and tropical climates are found, as there is drastic variation in geography in the district. It receives 3880.3 mm an average annual rainfall.

Average per capita income of the district is Nrs. 13,761 (US$ 199.43). Basic sources of income of the district are agriculture, tourism and foreign job. The district can be categorized fair in terms of landing holding. Thirty-five percent population has land up-to one hectare and five percent people are land-less.

Indicators of Development with their average value are given in the Table 4.1. Column of indicators shows different indicators of development. The column with district average shows values of the indicators with the standard unit and column with data source shows the organization where those sets of information were available. Presenting this

table is just to show the performances of Indicators to compare the village level averages with these values.

4.2 Performances of Development Indicators

Table 4.1 Performances of Development Indicators of Kaski District

S. No.	Indicators	District Average	Data Source
1	Population Density	162 persons/sq.km	DDC
2	Per capita Income	Nrs. 13761.00	DDC
3	Population growth	2.81 percent	DDC
4	Infant mortality rate	16.4 person per 1000	DDC
5	Maternal mortality rate	73 per 100,000	DDC
6	Average age - Male - Female	58.26 years 60 years 56.5 years	DDC
7	Electricity coverage	47 percent	DDC
8	Literacy	57 percent	DDC,
9	Illiterate children (10-14 years)	12.38 percent	ICIMOD, 1997
10	Educationally disadvantage population	17.68 percent	ICIMOD, 1997
11	Landless and marginal farm house hold	41 percent	ICIMOD, 1997
12	Drinking water coverage	85.14 percent	ICIMOD, 1997
13	Farm size	0.57	ICIMOD, 1997
14	Livestock per farm household	2.95	ICIMOD, 1997
15	Cropping intensity	175.96	ICIMOD, 1997
16	Percentage of irrigated area	7.57	ICIMOD, 1997
17	Road density	9.75	ICIMOD, 1997
18	Percentage share of females in literacy	39.55	ICIMOD, 1997
19	Percentage share of females in non-agriculture occupation	24.77	ICIMOD, 1997
20	Percentage share of elected females at district level	3.44	ICIMOD, 1997
21	Percentage share of female teachers at primary level	27.40	ICIMOD, 1997
22	Percentage share of girls enrolled in primary level	48.82	ICIMOD, 1997
23	Percentage of girl dropout at primary level	20.73	ICIMOD, 1997
24	Percentage of area with slopes above 30 degrees	73.62	ICIMOD, 1997
25	Per capita forest area (>10% crown density)	0.28	ICIMOD, 1997
26	Percentage of grassland area	13.44	ICIMOD, 1997
27	Percentage of cultivated area	14.73	ICIMOD, 1997
28	Ratio of non cultivated area to cultivated area	4.46	ICIMOD, 1997
29	Gross rural population density	0.95	ICIMOD, 1997

Source: DDC, 2000 and ICIMOD, 1997.

4.3 Administration Division of Geographical Area

Kaski district is divided into three constituencies. One person is elected for Parliament from each constituency. So the district elects three Members of Parliament (MPs) out of 205 MPs. Generally, population is the criteria for the division of constituency. Population size is nearly equal in each constituency.

The district is again divided into 13 Ilaka, which are divided into 43 Village Development Committees, one sub-metropolitan city and one municipality. Generally, there are four Village Development Committees in one Ilaka, except that where there is no municipality. These political units are further divided into 420 wards, where all VDCs have nine wards, Pokhara sub-metropolis has 18 wards and Lekhnath municipality has 16 wards (table 4.2).

Table 4.2 Administrative Division of Kaski District

S. no	Constituency no.	Ilaka no	Village Development Committees
1	1	1	Rupakot, Thumki, Deurali, Siddha
2		2	Lekhnath-1,8 to 15, Bharatpokhari
3		3	Mijuredanda, Saimarang, Bhachowk, Hansapur
4		4	Kalika, Majhthana, Lekhnath-2 to 7
5		5	Namarjung, Parche, Sildujure, Thumakodanda
6	2	6	Pumdibhumdi, Kristi, Nirmalpokhari
7		7	Pokhara-1-15, 17 and 18, Arbavijaya
8		8	Lamachaur, Bhalam, Kahun, Mauja, Pokhara-16
9	3	9	Kaskikot, Sarangkot, Chapakot, Bhadaure
10		10	Ghandruk, Dangsing, Lumle, Salyan
11		11	Lwangghalel, Dhampus, Dhital, Dhikurpokhari
12		12	Reevan, Lahachowk, Ghachowk, Hemja
13		13	Machhapuchre, Saradikhola, Puranchaur, Armala

Source: District Development Committee office, Kaski, 2001.

People elect five members including one ward chairperson and one women candidate from every ward. VDC chairperson and vice-chairperson are elected from the whole VDC. This committee again selects one representative from lower caste group, women and four persons from intellectuals/social workers. Altogether, 53 persons constitute the Village Assembly. The VDC chairperson, vice-chairperson, ward chairpersons, lower caste representative and women representative altogether 13 persons constitute VDC executive committee. There is one secretary - a government employee, provided for facilitation of administrative, financial and other day to day work in the VDC.

There is no such body in the Ilaka level. One Ilaka elects one member from members of its constituent VDCs and municipality assembly. The elected members of VDC and municipality assembly elect chairperson and vice-chair person for DDC. This committee thus constituted from the elected persons elects two persons including one women representative and one lower caste representative for DDC executive committee. The Member of Parliament and Upper House are the automatic members of the executive

committee. There is one secretary to assist DDC for day to day official routine works and all district development activities. Table 4.2 shows the details of the name of VDCs and ward of municipality and Sub-metropolis which Ilaka and constituency they belong to.

4.4 District Organization Structure

The objective of explaining district organization structure is not to assess its adequacy or appropriateness in terms of human resources, but to describe the availability of human resources for planning and implementation of development activities and existing linkages of different district line agencies for the coordination mechanism. DDC organization chart is shown in Figure 4.3.

District council having 115 persons, the highest authoritative body in the district structure makes overall decision in the district. This body meets once in a year for discussion and approval of activities planned, prioritized and forwarded by the lower planning units of DDC. The DDC chairperson heads the council.

DDC, headed by the DDC chairperson is the next lower level in the district organization structure. DDC implements the decision made in the DDC assembly. This committee meets every month where district line agencies are also involved. The monthly meeting reviews the progress, assess the problems associated in the implementation of activities in different line agencies. The meeting minute is forwarded to Ministry of Local Development for information and approval of any agenda or if there are some necessary amendments in the pervious decision.

To assist the day to day work of DDC there is a Secretariat, which comprises of government employee including one Local Development Officer (LDO). Under LDO's direct supervision, there are four sections with one head: engineering section, planning section, program section and local trust fund section. The later two sections are recently established under local governance act with UNDP support. LDO coordinates with the district line agencies, VDCs and other development agencies for follow up of decision made in DDC.

Engineering section has other junior staffs to support infrastructure planning and implementation in the district. Similarly, Planning, evaluation and Administration section has other junior staffs to support administration, account, vital statistics, registration, store, computer and planning. VDC secretaries come under this section. These VDC secretaries station at the VDC and report to LDO once in every month. Altogether there are 122 staffs in the DDC secretariat in Kaski district.

4.5 District Planning Process

DDC collected data from 30 percent household sampling in each VDC. For the survey, National Planning Commission GIS Unit prepared questionnaires for data collection. The NPC conducted training to district information officers for three days. Questionnaires were pre-tested in the training and comments and feedback were collected. From those feedback and comments questionnaires were updated. The information officers provided one-day echo training to VDC secretaries. VDC secretaries collected data from the VDC. These data were checked and entered in the computer in fox-pro software in DDC. Based on this database, DDC analyzed and prepared GIS maps for planning purpose.

District Development Committee
Kaski

Organization Chart

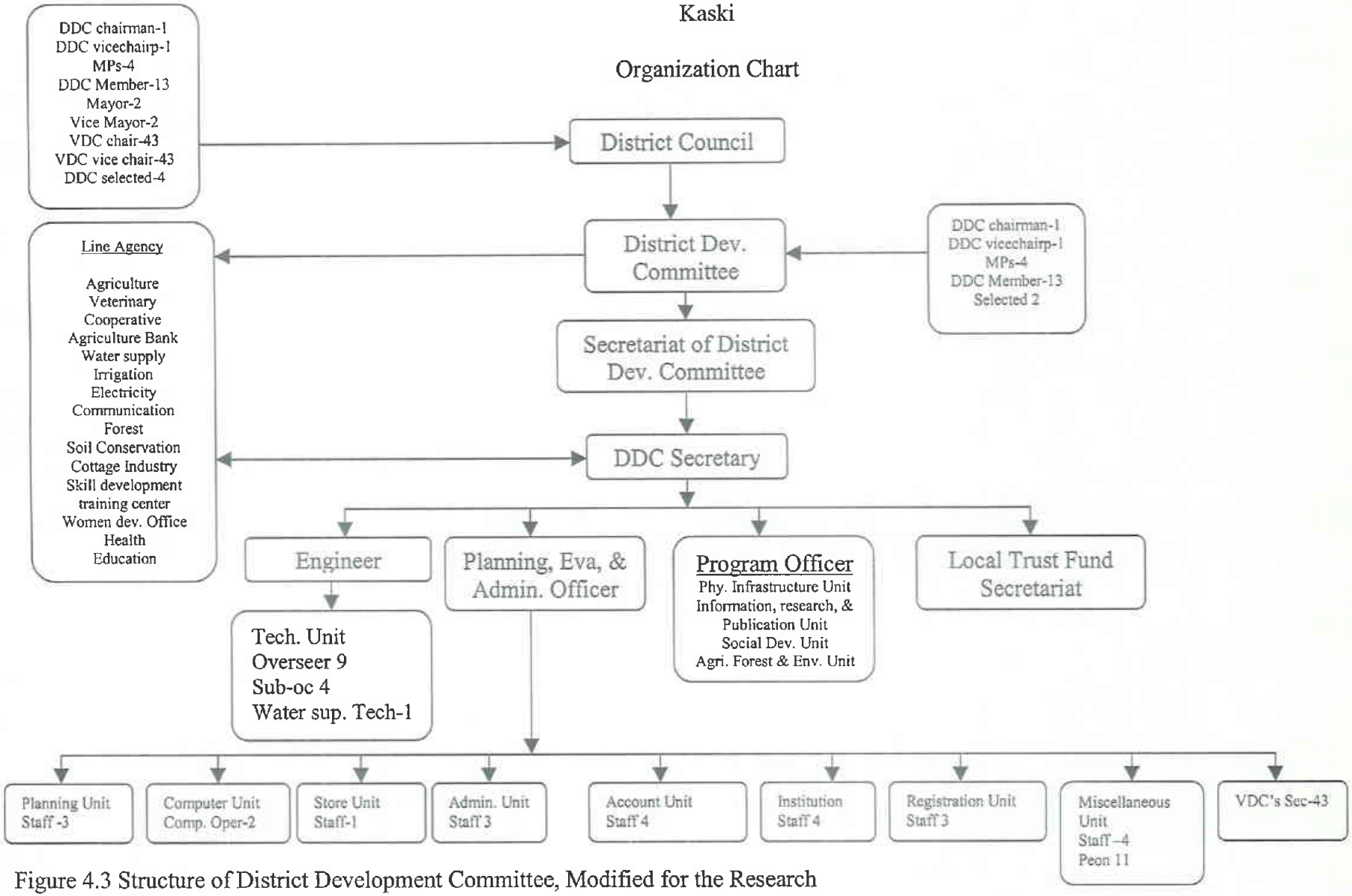


Figure 4.3 Structure of District Development Committee, Modified for the Research

Data and information are collected from the sectoral line agencies also in the planning process.

District planning starts at the smallest unit called wards and crosses various steps to be completed (Figure 4.3). The steps can basically be divided into the following headings.

4.5.1 Preparatory Workshop

This is the first and most basic step of the planning process in the district level. All members of DDC, representatives of sectoral line agencies, NGOs and other development-related organizations, VDC chairpersons, vice-chairpersons and secretaries participate in the meeting. The information unit explains the situation of the district through the result of analysis to the participants to make them aware about the problem and needs of the community. The purpose of the meeting is also to announce tentative budget of the development agencies, orient members on the steps and schedule (time framework) for preparing district development plan. The project request form is distributed to VDC representatives to identify the programs and projects at the local level.

4.5.2 Village Assembly Committee

This committee comprises of VDC executive committee, representatives of political parties, representatives of sectoral line agencies, important persons, teachers and NGO representatives. The assembly prioritizes the activities identified by the people in the ward level. Each VDC receive NRs. 500,000 as a grant for local level projects in Nepal. The committee identifies the projects that can be accomplished through this fund and projects that need assistance from the DDC and sectoral line agencies. These identified and prioritized projects are forwarded to Ilaka level meeting.

4.5.3 Ilaka-level Meeting

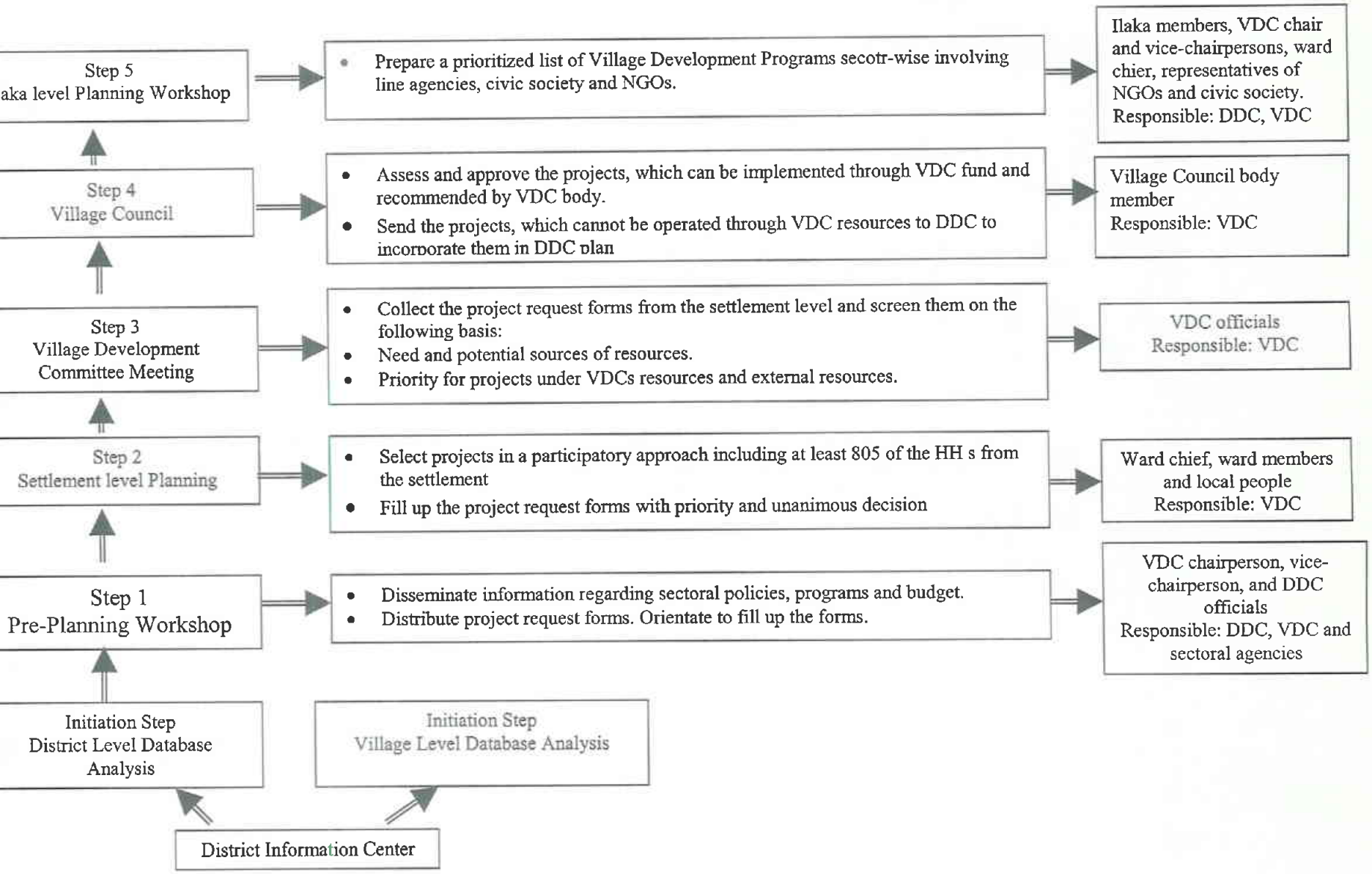
The participants of the meeting are the respective Ilaka member of DDC, chairperson and vice-chairperson of constituent VDC, representatives of sectoral line agencies, party representatives, NGO representatives, and important persons. The projects requested by constituent VDCs are prioritized and send for discussion to subsequent upper-level meeting. Generally, five projects of each VDC are recommended in this meeting.

4.5.4 Sectoral Committee Meeting at the DDC

There are four sectoral committees in the DDC: a) agriculture, forestry, and the environment; b) social development; c) industries and others; and d) physical infrastructure. This meeting is important in widening the understanding on sectoral projects and estimated budget. Three-member sectoral committee, concerned sectoral line agency chiefs, DDC members, DDC program officers participate the meeting. Generally, the Ilaka-level projects are approved in this meeting. But, my experience after participating in the DDC assembly is that these committees are not clear about their responsibility where another constraint for the committee is limited time frame.

District Development Committee Planning Process

Steps of Planning	Work/ Activities	Participants
Step 10 National Planning Commission Ministry of Local Development Secotral Ministries	• Analyze and assess the DDP of the district • Approve sectoral programs/projects and allocate resources to the sectoral agencies	Representatives from NPC and Sectoral Ministries Responsible: NPC and MLD
Step 9 District Council	• Assess and analyze proposed participatory District Development Plan • Approve the District Development Plan (DDP)	DDC officials and council members, Responsible: DDC
Step 8 District Development Committee Meeting	• Assess and finalize the proposed sectoral programs and identify programs that can be operated by DDC and those needing external support. • Prepare multi-year plans	DDC chairperson, vice-chairperson and members Responsible: DDC
Step 7 District Planning Co-ordination Committee Meeting	• Hold meeting for further assessment and analysis of sectoral committee's development plans. • Assure that there is no of duplication of project in any sectoral plan	DDC members and member secretary of sectoral agencies Responsible: DDC
Step 6 Sectoral Planning Committee Meeting	• Assess and analyze the prioritized projects of different sectors • Incorporate prioritized projects into different sectoral committee's development plans.	Sect, committee coordinators, DDC members and line agencies chief


Step 5
aka level Planning Workshop
Prepare a prioritized list of Village Development Programs secotr-wise involving line agencies, civic society and NGOs.
Ilaka members, VDC chair and vice-chairpersons, ward chier, representatives of NGOs and civic society. Responsible: DDC, VDC
Step 4
Village Council
Assess and approve the projects, which can be implemented through VDC fund and recommended by VDC body.
Send the projects, which cannot be operated through VDC resources to DDC to incorporate them in DDC plan
Village Council body member
Responsible: VDC
Step 3
Village Development Committee Meeting
Collect the project request forms from the settlement level and screen them on the following basis:
Need and potential sources of resources.
Priority for projects under VDCs resources and external resources.
VDC officials
Responsible: VDC
Step 2
Settlement level Planning
Select projects in a participatory approach including at least 805 of the HH s from the settlement
Fill up the project request forms with priority and unanimous decision
Ward chief, ward members and local people
Responsible: VDC
Step 1
Pre-Planning Workshop
Disseminate information regarding sectoral policies, programs and budget.
Distribute project request forms. Orientate to fill up the forms.
VDC chairperson, vice-chairperson, and DDC officials
Responsible: DDC, VDC and sectoral agencies
Initiation Step
District Level Database Analysis
Initiation Step
Village Level Database Analysis
District Information Center

4.5.5 District Coordination Committee Meeting

DDC members, coordinators of the sectoral committee, sectoral line agencies chiefs and NGO representatives participate the meeting to discuss the duplication and overlapping of projects. Here, the projects are redistributed and assigned among the competing agencies for different locations. This committee can amend, add or subtract and reprioritize the projects and presents the draft to DDC meeting for the discussion.

4.5.6 District Development Committee Meeting

The DDC chairperson, vice-chairperson and members attend the meeting. This is a preparatory meeting prior to district council meeting, which presents consolidated list of projects with their estimated budgets for discussion in the district assembly to get final approval – the final step of the district planning.

4.5.7 District Council Meeting (district assembly)

This meeting is annual meeting and the participants are the DDC chairperson, vice-chairperson, members, sectoral line agencies chiefs, VDC chairpersons, vice-chairpersons, municipalities chairpersons and vice-chairpersons, representatives of political parties, member(s) of parliament, representatives of NGOs, INGOs. DDC chairperson presents projects and budgets and sectoral line agencies provide the supporting facts and information on projects and budgets. Projects and budgets of respective line agencies and DDC are to be approved from this meeting for implementation.

After the approval of the projects, the document is circulated to the Ministry of Local Development (MLD), and National Planning Commission (NPC). It is learnt that 90% to 95% of these projects are approved by the NPC for implementation (Routray, 2000).

Project Implementation. The approved projects are implemented mostly by the user groups, some by the local NGOs and some by sectoral agencies. Few activities are implemented by DDC through its budget, but implementation is mostly through the user group.

4.6 District Vision and Donor Support

District has set a vision for 20 years: "To develop the district as a focal point of tourism development, health and education center and also to make district self-sufficient in agriculture."

District's aspiration to develop itself as tourist center is coherent to its natural resource endowment. As a regional center, district has infrastructure such as road network, hospitals, educational centers etc. These facilities are definitely better in the urban area.

However, The rural area is still backward and rural urban gap is ever increasing. So it is imperative to focus the development in rural areas and work to reduce the disparities. Fragile geology and heavy rainfall the cause of heavy soil loss is another critical problem in the district. The virtuous circle of poverty and soil erosion conservation demands highly technical and participatory planning of development activities. As discussed above, there

are problems of both monetary and human resources. In one hand there is inadequate resources and in the other hand, there is problem of utilizing the available resources efficiently.
These problems are difficult to solve through the resources of the district and center government only. Donors support in the grass root is also needed. Therefore, it is imperative to create conducive environment for the donors in the district.

It has been observed that donor presence is higher in the district. The major reasons behind may be that the district is nearer from the capital and has easy transportation and communication access, and the district is one of the beautiful places of the country. Donors are working with various objectives, which can be summarized in the following headings.

4.6.1 Rural Development

UNDP's Participatory District Development Project PDDP, is working in Kaski district from November 1995 as a follow-up program of earlier decentralization support program (DSP). This project supports the district with two programs: District management support and village development program. District management support includes information system & GIS, participatory planning & monitoring system, management support, and human resources development. Village management support component is being implemented in the whole district and its village development program (social mobilization) component is in eleven VDCs.

Japanese organization (JICA) is working for watershed management with District Soil Conservation Office. It is implementing integrated programs for watershed management and poverty alleviation in seven VDCs of the district.

United Mission to Nepal is supporting Rural Development Training Center in Pokhara. It is a self-sustaining organization. It provides training on water supply system management, animal health improvement program, and other community empowerment program.

4.6.2 Infrastructure Development

UNCDF supports for infrastructure projects for poverty alleviation and World Bank support in rural infrastructure project.

4.6.3 Tourism Development

Asian Development Bank ADB, supports tourism infrastructure development project

4.6.4 Health and Sanitation Development

UNICEF supports in DPCP in six VDCs and health, sanitation child & other programs in other VDCs also. UNFPA another UN organization supports the district in population targeted programs. International Nepal Fellowship (INF) also supports the district in health sector. It provides management and equipment supports to the regional hospital. In addition to this the INF supports in leprosy and drug awareness program also.

Chapter 5
Information System for Planning in Nepal

This chapter describes the sources of information, types of information available, the operating level of organization, and horizontal and vertical flow of information with DDC (Figure 5.1). This also describes about the gap of the data and information for poverty analysis and problem associated with the DDC database and its management. The information described hereunder is based on the reports from data providing organizations, interviews with the planners, local leaders and personnel of respective organization, and researcher's self-observation and experiences.

5.1 Data and Information for Planning in Nepal

Mostly data and information are used interchangeably, it is therefore important to make distinction between them. The data is the language, mathematical and other symbol surrogates agreed upon to represent people, object, events and concepts. Indeed it is the set of raw facts that can be processed for use. In the other hand the information is the data placed into a meaningful context for the user (Burch, et. Al, 1983).

Certainly, there is a need of strong data and information base for the successful planning and development operations at different levels. The decisions making at appropriate time and place as a planning exercise depends on what kind of data and information are available. In the present days information technology has been advanced in the developed countries. These countries spread awareness of the importance of information technology and computer use in planning development activities. As a result the computer use has been increasing in the developing countries in different level for planning. In rural and regional planning also the use of computer software including GIS are currently been used. Still the integration of sectoral data required for planning is in process at various level.

5.1.1 Central Bureau of Statistics

Central Bureau of Statistics (CBS) is under National Planning Commission in Nepal. It is functional in national level and regional level and collects multiple type data such as demographic, agriculture, socio-economic, physical facilities etc. This is the largest organization involved in taking population data in the country in every ten years. The information available through CBS are generally population table, primary census abstract, general economic table, migration table, fertility table, table with disabled person in household, scheduled caste and tribe table, education and other tables. The CBS is planning to collect women dis-aggregated data in the coming census 2001. In addition to the census, CBS conducted Nepal Living Standard Survey (NLSS) 1996, Nepal Labor Force Survey (NLFS) 1998/99, Nepal Agriculture Survey in the national level. The nature of data available in different spatial level in CBS is given in Table 5.1. CBS does not have any formal linkage with DDC and VDC in data collection, sharing and dissemination, but the data and information compiled by CBS is accessible and available to all individuals and organizations.

CBS sends circular regarding date and process of data collection, to DDC and VDC for coordination, but CBS collects data independently. Formats are prepared and the

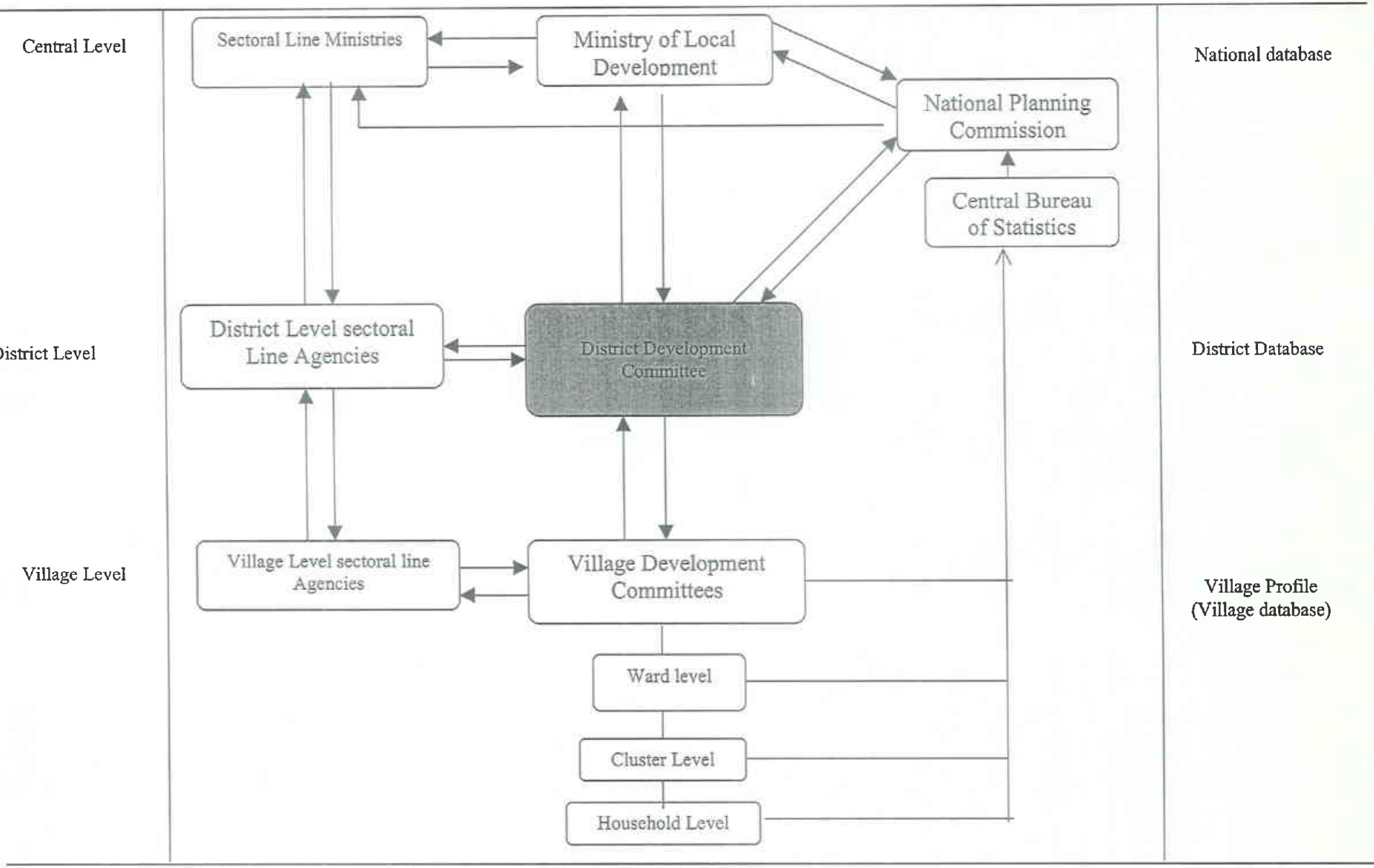

Central Level
Sectoral Line Ministries
Ministry of Local Development
National Planning Commission
Central Bureau of Statistics
National database
District Level
District Level sectoral Line Agencies
District Development Committee
District Database
Village Level
Village Level sectoral line Agencies
Village Development Committees
Village Profile (Village database)
Ward level
Cluster Level
Household Level

Table 5.1 Multiple Type Data, Collected and Distributed by CBS

S.no	Type of Census	Nature of Data	Level of Availability (aerial unit)
1	General population	Area, House and population, Population classified by age, sex, mother tongue, Decadal variation of population, Schedule caste	National, District and VDC level
2	Primary census abstract	Area, Households, Population, Scheduled castes, Literate, Worker, Marginal workers and non-workers.	National, District and VDC level
3	General Economic Table	Classification of workers according to main activities – primary and others, educational levels, by age, sex, major and minor groups etc for rural and urban area.	National, District and VDC level
4	Migration Table	Migrants residing in the place from last many years, migrant by age, sex, place of last residence, reason for migration, literacy, worker/non-worker classification, rural to rural, rural to urban, or to foreign.	National, District and VDC level
5	Schedule caste and schedule tribe	Same as general population tables for scheduled caste or tribe.	National, District and VDC level.
6	National census Handbook	Primary Census abstract, Land-use, Climate, Food and agriculture, Community facilities, Government finances, External Payment and Monetary Trade. International comparison. Miscellaneous	National and District Level.

Source: Modified from the Works of CBS, 1991 and Routray, (1990) to Fit for the Present Research.

trained manpower is used to collect data from the household level, cluster level, VDC level and district level. The raw data collected by CBS would be useful for VDC also for planning purpose, but the information cannot be given to VDC as it is raw and bulky says the deputy director of CBS.

There is variation in data standard in different sources. CBS clarified while drawn the attention in this regard as data standardization means different for different users, depending upon their requirements. CBS uses certain data standard that it has been used in previous census. CBS said that the NPC is highest body responsible to bring uniformity in such standard.

5.1.2 Department of Survey

Department of Survey operates in the national and district level. It produces topographic maps showing physical features, rivers, settlements, general land-use, transport link, and few basic community facilities. It also produces and provides political

maps of national, district and VDC level. It provides thematic maps of country and district level.

5.1.3 Department of Geology and Mining

Geology and Mining Department operates in the national, regional and district level. It provides geological map and data on various earth resources such as minerals.

5.1.4 National Planning Commission

National Planning Commission has established GIS unit, to prepare and update database, digitized maps and other information of districts of Nepal. It compiles digital data prepared and updated by the district information units. The unit is equipped with digital maps prepared by LRMP 1978, contour map of some part of Nepal prepared by Department of Survey, and other digital data from national level up to cluster level. Planning Commission has offices in five regional centers.

5.1.5 Election Commission

Election Commission is constitutional body, operates in national level and it has no formal tie with DDC. It collects and updates voter list of every citizen of 18 years every year. These data are collected through Chief District Officer in every district. Election commission sends ready-made voter list and survey-formats to the CDO office, which later goes to VDC through VDC secretary. The VDC secretary completes this information in consultation with VDC members and sends back to CDO office. Then it goes to Election Commission for final update. The voter list contains individual's information regarding district, village, ward number, cluster, house number, household chief and age. The information is useful for development organizations also.

5.1.6 District Line Agencies

District line agencies are both planning and implementing body. In the present context of newly enacted local self-governance act, district line agencies are not completely oriented to plan development activities through DDC. They collect data and information for the sectoral activities in their own way. They are principal sources of respective sectoral data in the district level.

However, Ilaka-wise and VDC-wise data could not be found in district line agencies. The line agencies have not collected VDC-wise dis-aggregated data.

5.1.7 District Development Committee

As described in the previous chapter, under local governance act, DDC is responsible for overall planning of the district and strong database and information is well-felt requirement there. Kaski DDC claims to be strong in this aspect. The types and nature of data and level of their availability in the district are given in the following table.

Data and information are collected and managed in three levels namely, household, settlement and VDC. Settlement level services data include land-use pattern, service units and migration information in the particular settlement. Similarly, VDC level data includes

Table 5.2 Types of Data and Level of Availability at District Level

S.no	Aspect	Nature of data	Level of availability
1	Demographic	Household, population by age, sex, caste	DDC and VDC level
2	Social	Landholding by sex, Food sufficiency by months, Livestock population, Irrigated land, Agriculture technology used, Types of cooking fuel used,	DDC and VDC level
3	Physical facility	Household distance form different resources, Electricity type and coverage, Drinking water coverage with different sources, Telephone, Services centers,	DDC and VDC level
4	Economic	Population by major occupation, Migration and reason, Household by debt, size, Income per household by occupation,	DDC and VDC level
5	Health	Diseases type and household, Malnutrition and household	DDC and VDC level
6	GIS map	District map with VDC boundary, Service centers in cluster level, Road network,	DDC, VDC and Cluster level

Source: Modified from the Works of Kaski DDC Information Unit 2000

the information on natural calamities that was occurred within the VDC if any, possible opportunities in the VDC, irrigation facilities, inter-settlement distances and I/NGO information.

5.1.8 The VDC

From planning aspect VDC is the most important stakeholders. VDC can analyze potentials, needs and problems of its constituting smaller clusters, because the local people are familiar with the local situation. This is the strongest point that decentralization act emphasized for participation of local people in development planning. However, due to the same reason, local people are not much concerned about collecting and managing data and information in their VDC.

As per the information given by DDC, only thirteen VDCs have village profile in Kaski district. Basic information found in the village profile is the demographic, natural resource endowment, culture, important places, physical amenities, social welfare indicators, working institutions etc. VDC profile formats are developed by Planning Commission, but documentation depends upon the I/NGO working in the respective VDCs The organization working in the VDC prepares profile as per their requirement and to reflect the works accomplished by them. Mostly the researcher and academicians use these profiles, not the planners. Practically, no database exists in the VDC level.

5.2 Data and Information Gap for Poverty analysis and Mapping

As per the objectives 2 and 3, views and opinion were collected from VDC chairpersons, vice-chairpersons, VDC secretaries, district line agency chiefs, planners from the central level offices and personnel from other data managing organizations. Based on the opinion, feedback and comments, findings are presented hereunder.

5.2.1 Data Availability

Out of 41 indicators (Figure 1.3) set for the research, 22 indicators were not found in the district level. The indicators value, which are not dis-aggregated at VDC level are: birth rate, infant mortality rate, primary school drop out, cropping intensity, land less and marginal hand-holders, entrepreneur, labor force engaged in non-agriculture to those engaged in agriculture. Similarly, women related data such as maternal mortality rate, representation of women in the decision making body are not dis-aggregated for village level.

All eight indicators of natural resources and environment-related data set for the research were not available in the DDC. The dis-aggregated data of these indicators for VDC could not be found in the respective district line agencies also. The Planning Commission GIS Unit possesses the digital data of LRMP 1978, digital map of the DDC with VDC boundary, and contour data prepared by Department of Survey. Data were to be generated for the VDCs from those available digital data. The data such as area under soil erosion and area under deforestation could not be found from any sources.

Road map is available in digital form in the DDC, but it is not dis-aggregated in VDC level. Data for VDC was generated from the GIS for the research. Similarly, distance of VDC from road-head or from city center or airport is also not available in the district.

5.2.2 Data Collection Method and Accuracy of DDC Database

DDC database is based on 30 percent households sampling from each constituting clusters of VDC. Out of 12 VDC chairpersons and vice-chair persons interviewed, all are not satisfied with the data collection method followed by the DDC. They said that they were not involved in the data collection in their VDC. Three VDC secretaries who were solely involved in the data collection in their respective working VDC also expressed the time limitation and resource limitation for data collection in household level. They said that the information regarding economic aspects is very difficult to collect. The individuals do not disclose the truth about income because they do not want to disclose their social condition to others. Additionally, informants cannot recall the information on income of a year at the time of survey. This constraint did not permit them to bring the true information from the household level.

The VDC secretary is only one staff in VDC and has to collect land revenue, register birth and death record, coordinate with DDC and other village level development organization, collect data and information required in DDC etc. in addition to day to day work assigned by DDC. Local governance act delegated authority to VDC, but did not review the manpower adequacy. Consequently, the position has heavy workload. The VDC secretaries do not get training and are not updated with the new information and technology. Consequently, the VDC is unable to collect and manage data and information in the VDC appropriately, which DDC could use for database management. In the other hand, data and information collected hastily through these heavily loaded staff, one cannot expect high quality information.

Therefore, the VDC chair persons, secretaries and information officer realized that there are errors in collected data, which accumulates further in the projected data from 30 percent sampling to 100 percent.

5.2.3 Other Problems Associated with Database

Non-matching data: DDC provided two sets of data one from the computerized database and another set prepared by combined effort of line agencies and DDC. The second set of data comprises of few indicators. Value of the indicators varies much in these two data sets. Similarly, database of DDC and the database of CBS are also non-matching for the common theme.

Weak vertical integration of data: So far vertical data integration is concerned, it is very weak in the district. As detailed out above, practically no database exists in the VDC. Data and information may go to the VDC from DDC, but VDC chairpersons and secretaries said that there are no physical facilities to store data and files systematically in the VDC. There is weak integration in the higher level also. Data collected by CBS is not taken into consideration by DDC and vice versa.

Unnecessary restriction of data by data manager: Some data are not available due to unnecessary restriction by data managers. I got data, which DDC produced, but not what I desired. Similarly, NPC GIS unit did not provide the contour map of the district saying that there is agreement between the producer and the GIS unit and cannot be issued to other users.

Database less oriented towards planning, development, monitoring and evaluation: Finally, the data are found to be more oriented towards fulfilling the data needs of government administration or responsible organization and not maintained for the data need for planning, development monitoring and evaluation.

Chapter 6
Measurement and Mapping of Poverty

This chapter provides the analytical results of the poverty situation of Kaski district of Nepal using annual average per capita income and different indices directly or indirectly linked to poverty situation. An attempt is made to generate various maps on individual indicators and also sectoral indices to express spatial picture and correlate between different sets of indices for the purpose of deeper understanding to the current poverty situation.

Out of 41 indicators selected for the study, data is available for 24. Therefore, analysis is done based on those available indicators.

6.1 Poverty Measurement

6.1.1 Based On Annual Average Per Capita Income

Poverty Incidence, Poverty Gap and Squared Poverty Gap (SPG) are computed from the Foster-Greer-Thorbecke (FGT) class of poverty measures.

$$P\alpha = \frac{1}{n}\sum(1-(Xi/Z))^{\alpha} \qquad \text{Equation 2.1}$$

Where

Xi	=	the per capita expenditure for those individuals who are below the poverty line and zero for those above poverty line
Z	=	the poverty line
n	=	the total population
α	=	0 for the Head Count Index, 1 for Poverty Gap and 2 for Squared Poverty Gap

When α is 0, 1, and 2, P_α is P_0, P_1 and P_2 respectively, which indicates Poverty Incidence, Poverty Gap and Squared Poverty Gap.

For the computation, Poverty Line (Z) is taken as Nrs. 4404.00 (NPC, 1998), population (n) as total population of a VDC and Xi as the average annual per capita income. Computed values of Poverty Incidence, Poverty Gap and Squared Poverty Gap are given in Table 6.1.

Poverty line is the minimum requirement for survival. People consume all their income and do not make saving at the income equal to poverty line or below. Therefore, it is considered that the average annual per capita income below poverty line is equal to the expenditure and is used in the formula for Xi.

The formula is applicable to those income values which is less than Poverty Line, as the value increases, quotient value of (1 - Xi/Z) becomes negative. Still, SPG is computed for the income values, which are greater than the poverty line. The Squared Poverty Gap value is positive. This SPG gives the idea of the intensity of poverty or how significant is the income with respect to poverty line.

Table 6.1 VDC Grouping on the Basis of Poverty Incidence, Poverty Gap and Squared Poverty Gap

S.no	VDC	Population	Per Cap. Income	Poverty Incidence	Poverty Gap	Squared Pov. Gap	Remarks
1	Ghandruk	5647	729	1	0.83	0.70	V.poor
2	Sildujure	4013	1229	1	0.72	0.52	V.poor
3	Kaskikot	5643	1631	1	0.63	0.40	V.poor
4	Rupakot	3967	1936	1	0.56	0.31	V.poor
5	Lamachaur	3193	2835	1	0.36	0.13	V.poor
6	Majhthatna	4073	2881	1	0.35	0.12	V.poor
7	Saimarang	2073	3490	1	0.21	0.04	V.poor
8	Hansapur	2357	3536	1	0.20	0.04	V.poor
9	Kalika	4470	3673	1	0.17	0.03	V.poor
10	Chapakot	3483	4040	1	0.08	0.01	V.poor
11	Sarangkot	5720	4108	1	0.07	0.00	Poor
12	Nirmalpokhari	4930	4117	1	0.07	0.00	Poor
13	Rivan	1500	4255	1	0.03	0.00	Poor
14	Armala	6020	4298	1	0.02	0.00	Poor
15	Ghachok	2693	4397	1	0.00	0.00	Poor
	Poverty Line NRS.4404.00. A cutoff line						
16	Lumle	1044	4497		-0.02	0.00	Poor
17	Kristinachnechau	6167	4525		-0.03	0.00	Poor
18	Siddha	3247	4681		-0.06	0.00	Poor
19	Bhadauretamagi	4404	4699		-0.07	0.00	Poor
20	Thumki	2794	4790		-0.09	0.01	Fair
21	Bharatpokhari	9597	4979		-0.13	0.02	Fair
22	Mijuredanda	3447	5476		-0.24	0.06	Fair
23	Puranchaur	4137	5624		-0.28	0.08	Fair
24	Deurali	3450	5737		-0.30	0.09	Fair
25	Lwangghalel	5673	5920		-0.34	0.12	Fair
26	Kahu	2224	5963		-0.35	0.13	Fair
27	Dhital	4163	6110		-0.39	0.15	Fair
28	Dhampus	2957	6297		-0.43	0.18	Fair
29	Dhikurpokhari	6193	6414		-0.46	0.21	Fair
30	Mauja	2513	6417		-0.46	0.21	Fair
31	Thumakotdanda	4560	6417		-0.46	0.21	Fair
32	Bhalam	3007	6864		-0.56	0.31	Fair
33	Bhachok	2263	7226		-0.64	0.41	Good
34	Lahachok	4100	7492		-0.70	0.49	Good
35	Pumdi Bhumdi	6854	7746		-0.76	0.58	Good
36	Salyan	3927	7788		-0.77	0.59	Good
37	Arbabijaya	3470	9041		-1.05	1.11	Good
38	Parche	3640	9755		-1.22	1.48	Good
39	Machhapuchre	1647	9768		-1.22	1.48	Good
40	Sardikhola	3410	11581		-1.63	2.66	Good
41	Hemja	7521	12078		-1.74	3.04	Good
42	Namarjung	1410	12342		-1.80	3.25	Good
43	Dangsing	2417	12655		-1.87	3.51	Good

Source: Computed from the Average VDC Income Obtained from DDC Kaski, 2000

From the Table 6.1, following observation are made

- Average annual income of VDCs comes out to be Nrs. 5815.00.
- annual average per capita income of fifteen VDCs is below poverty line,
- average annual income of rest of the 28 VDCs are higher than the poverty line.
- Among fifteen VDC below poverty line, ten VDCs have SPG values greater than 0, which means that the income level of these VDC is significantly below the poverty line. The remaining five VDCs of the poor group and other four VDCs with higher income group have 0 value of SPG. This shows that the income of these VDCs do not differ much from the poverty line. In other words, the VDCs with 0 value of SPG are more vulnerable to poverty and can fall within poverty line or rise above poverty line if there is slight change in the income sources or natural conditions such as climate.

On the basis of these findings, 43 VDCs are grouped into following four categories (Figure 6.3).

1. Very Poor (Nrs.729 – 4040)	those VDCs whose income is less than poverty line and whose value of Squared Poverty Gap is above 0. Ten VDCs fall into this group.
2. Poor up (Nrs. 4040 – 4699)	those VDCs whose income slightly varies from poverty line or down and the Squared Poverty Gap is 0. Nine VDCs fall in this category.
3. Fair higher (Nrs. 6499 – 6864)	those VDCs whose average annual per capita income is than the poverty line and falls around the average income of the VDCs that is Nrs. 5815.00. Thirteen VDCs fall in this group.
4. Good than (Nrs. 6864 – 12655)	those VDCs whose average annual income is much higher the average income of the VDCs. Eleven VDCs are falling in this group.

6.1.2 Poverty Measurement Based on Overall Indicators

6.1.2.1 List of Selected Indicators

Subject to availability of data, 24 indicators are taken which are given hereunder. The suffix Xi and Yi at the end of each indicator denotes the transformed value of ith indicator. Xi is the transformed value of indicator, which is directly proportional to the wellbeing and Yi is the indicator, which is inversely proportional to the wellbeing. The number suffixed with X and Y shows the serial number of the indicator appearing in the list of indicators.

TVs of these indicators are computed by 0 to 1 scoring transformation method. If 1 signifies good condition, the directly proportional indicators (X) are converted to 1 to 0 and the inversely proportional indicators (Y) are converted to 0 to1. That is, the highest value in the first case is converted to 1 and highest value in the second case is converted to 0. These two types of indicators are given separately below.

List of Indicators directly proportional to the social wellbeing

1. Annual average per capita income (X_1)
2. Percentage of population employed from secondary and tertiary sectors (X2)
3. Percentage of female workers in non agricultural occupation (X_3)
4. Household farm size in ha. (X_4)
5. Livestock (large and small ruminants) per farm household (X_6)
6. Overall literacy rate (X_8)
7. Percentage of girls in primary education (X_{10})
8. Percentage of populations having access to clean drinking water (X_{12})
9. Percentage of irrigated area (X_{13})
10. Percentage of household with electricity (X_{14})
11. Road density (X_{16})
12. Number of banking units per 1000 people (X_{17})
13. Number of Cooperatives per 1000 people (X_{18})
14. Number of agriculture centers per 1000 people (X_{19})
15. Percentage of cultivated area (X_{21})
16. Percentage of forest area (X_{22})
17. Percentage of grass land area (X_{23})
18. Rural population density (X_{24})

List of indictors inversely proportional to the wellbeing

1. Percentage of households with food deficiency from 3 to 9 months (Y_5)
2. Percentage of thatched roof house (Y_7)
3. Percentage of females illiterate (10 + years) (Y_9)
4. Percentage of Lower cast population (Y_{11})
5. Road access time in hours from VDC center to road-head (Y_{15})
6. Percentage of area above 30 degree slope (Y_{20})

6.1.2.2 Social Wellbeing Index, SWI, (CI_1)

In addition to the income indicator for assessing poverty, a group of four indicators are selected, which reflect the poverty situation directly to prepare composite index for further analysis. It is a proxy indicator for measuring poverty. Lower the value of the composite index, higher is the poverty or higher the value of the social wellbeing index the higher is the social wellbeing and lower is the poverty. These indicators are:

1. Household farm size in ha (X_4)
2. Percentage of households with food deficiency from 3 to 9 months (Y_5)
3. Percentage of thatched roof house (Y_7)
4. Percentage of Lower cast population (Y_{11})

6.1.2.3 Sectoral Indicators

The remaining indicators, except average per capita income and four indicators in the social well-being index, are divided into five sectors. These sectors with their constituting indicators are given below. The suffix X and Y denote the same meaning as above. The indicators are not repeated in the groups except in aggregate development indicator (CI_6).

1) Natural Resources Sector, NRS, (CI_2)

In this group, five natural resources related indicators are taken. Higher the index values the better is the condition of the status of natural resources sector and better is the VDCs. Here, for a particular VDC, when cultivated area is higher the grassland and the forest area cannot be higher and the same is true in case of forest area and grassland with other two. All three cannot be the highest at a time. Therefore, the best VDCs are those, which have balanced value of these indicators or in other words, VDCs having three areas equally distributed are better off.

1. Percentage of areas above 30 degree slope (Y_{20})
2. Percentage of cultivated area (X_{21})
3. Percentage of forest area (X_{22})
4. Percentage of grass land area (X_{23})
5. Rural population density (X_{24})

2) Social Sector, SS, (CI_3)

This sector has four indicators. The higher the value, the better is the situation of VDC in social aspect.

1. Percentage of population employed from secondary and tertiary sectors (X_2)
2. Overall literacy rate(X_8)
3. Percentage of population having access to clean drinking water (X_{12})
4. Percentage of household with electricity (X_{14})

3) Infrastructure and Institution Sector, IIS, (CI_4)

This sector consists of six indicators. The higher the composite index value for a particular VDC, the better is the situation of this sector in the VDC.

1. Percentage of irrigated area (X_{13})
2. Road access time from VDC to road-head (Y_{15})
3. Road density (X_{16})
4. Banking units per 1000 people (X_{17})
5. Cooperatives per 1000 people (X_{18})
6. Agriculture Centers per 1000 people (X_{19})

4) Women Empowerment Sector, WES, (CI_5)

Data availability permitted to take three indicators in this sector. Higher the value of indices, better is the status of women in the VDCs.

1. Percentage of female workers in non agricultural occupation (X_3)
2. Percentage of female Illiterate (10 + years) (Y_9)
3. Percentage of girls in primary education(X_{10})

5) Aggregate Development Index or indicator reflecting development level of the VDC and indirect measure of poverty, ADI, (CI_6)

In this group, fifteen indicators are taken. These indicators reflect development of a particular VDC and these indicators show poverty of a VDC indirectly. Higher the value of the index better is the situation of development level.

1. Percentage of population employed from secondary and tertiary sectors (X2)
2. Percentage of female workers in non agricultural occupation (X_3)
3. Livestock (large and small ruminants) per farm household (X_6)
4. Overall literacy rate (X_8)
5. Percentage of females illiterate (10 + years) (Y_9)
6. Percentage of girls in primary education (X_{10})
7. Drinking water coverage (X_{12})
8. Percentage of irrigated area (X_{13})
9. Percentage of household with electricity (X_{14})
10. Road access time in hours from VDC center to road-head (Y_{15})
11. Road density (X_{16})
12. Banking unit per 1000 people (X_{17})
13. Cooperatives per 1000 people (X_{18})
14. Agriculture centers per 1000 people (X_{19})
15. Rural population density (X_{24})

Composite Indices are computed for each group indicator applying the equation 3.3 given in Chapter 3. It is the mean of the transformed value (TV) of the constituting indicators and can be written as given below.

If the composite indices are CI_1, CI_2, CI_3, CI_4, CI_5, and CI_6 for the indicators and Xi and Yi are the transformed value of the indicators as shown above, then equation 3.3 can be rewrite as

$$SWI\ (CI_1) = (X_4 + Y_5 + Y_7 + Y_{11}) / 4 \qquad \text{Equation 6.1}$$

$$NRS\ (CI_2) = (Y_{20} + X_{21} + X_{22} + X_{23} + X_{24}) / 5 \qquad \text{Equation 6.2}$$

$$SS\ (CI_3) = (X_2 + X_8 + X_{12} + X_{14})/4 \qquad \text{Equation 6.3}$$

$$IIS\ (CI_4) = (X_{13} + Y_{15} + X_{16} + X_{17} + X_{18} + X_{19}) /6 \qquad \text{Equation 6.4}$$

$$WES\ (CI_5) = (X_3 + Y_9 + X_{10}) / 3 \qquad \text{Equation 6.5}$$

$$ADS\ (CI_6) = (X_2 + X_3 + X_6 + X_8 + Y_9 + X_{10} + X_{12} + X_{13} + X_{14} + Y_{15} + X_{16} + X_{17} + X_{18} + X_{19} + X_{24}) / 15 \qquad \text{Equation 6.6}$$

The condition of a particular group indicator in a VDCs is categorized into four groups as Very poor, Poor, Fair and Good based on their composite index value (Table 6.7 and 6.8).

Computation details of these composite indices are shown in the Appendix 10.The values of SWI, NRS, SS, IIS, WES and ADS are tabulated in Table 6.7 and Table 6.8.

6.1.2.4 Analysis by Correlation Coefficient

i) Correlation of Income with Different Indicators

Correlation coefficients are computed for income with other group indicators. The result shows that income has significantly positive relation with the social wellbeing index. It has very weak correlation with aggregate development index and women empowerment aspect. But it showed negative correlation with natural resources sector and infrastructure and institution sector.

This is an anomalous character of the income. It can be an exceptional case. The reason behind it can be two: first, it may be due to tourism, jobs in British Army and employment in foreign countries. Income from these two sectors is exceptionally high in comparison with other sectors. It is well known that the Kaski district is a most famous district for tourism, and many people are engaged in this business. Additionally, few castes such as Ghale, Gurung are famous warriors and recruited in British Army from this area. Their remuneration and remittance is very high in comparison to other sources of income. These people also reside in the remote side of the district. But the data are not available to support this statement. Second, there can be flaw in the data itself.

Table 6.2 Correlation Coefficient between Income with Other Group Indicators

	SWI	NRS	SS	IIS	WES	ADS
Average per capita income per annum	.332*	-.093	.190	-.081	.139	.082

* Correlation is significant at the 0.01 level (2-tailed).
Source: SPSS Computation

ii) Correlation of Social Wellbeing Index with Other Sectors

Correlation coefficients are computed between poverty composite Index and NRS, SS, IIS and WES. The values are presented in Table 6.3. The table shows that the social well being index has positive relation with the natural resource sector, social sector infrastructure and institution sector, and women empowerment aspect. But here also the coefficients are smaller and signify the feeble relation of poverty composite index with other group indicators. The reason can be the same as in the case of income and other sectors.

iii) Correlation of Natural Resource Sector with Other Sectors

Correlation of natural resources sector with other sector can be seen in the Table 6.3. It has positive correlation with other sector. Leaving the social wellbeing index, natural resourse sector is significantly correlated to all other sectors. This sector has stronger correlation with infrastructure and institution sector with a coefficient of 0.640. That signifies that where natural resources are balanced, the infrastructure development is better.

Table 6.3 Correlation Coefficient between Sectoral Composite Indicators

	SWI	NRS	SS	IIS	WES
SWI	1.000	.131	.091	.067	.014
NRS	.131	1.000	.424*	.640*	.224*
SS	.091	.424*	1.000	.238	.552
IIS	.067	.640*	.238	1.000	-.130
WES	.014	.224	.552	-.130	1.000

* Correlation is significant at the 0.01 level (2-tailed).
Source: SPSS computation

iv) Correlation of Road Distance and Road Density with Group/Sectoral Indicators

Correlation coefficients are computed between group/sectoral indicators with road distance and road density (Table 6.4). Distance in hours from VDC center to road-head shows negative correlation with all groups or sectors. This means that when the road distance increases the sectoral development decreases. The VDCs far from the road-head are poorer in all aspects. The road distance has less correlation coefficient with social wellbeing index and also not significant, whereas it is significantly correlated with other indicators.

Similarly the road density has significant correlation with natural resource sector and women empowerment aspect. This shows that the higher road density characterizes the better natural resource endowment and literacy. Road density has negative correlation with

Table 6.4 Correlation Coeff. Between Road Distance, Road-density, CI_1, CI_2, CI_3 and CI_5

	SWI	NRS	SS	WES	Road head distance in hour from VDC center	Road density (total motorable road length in Km per sq.Km)
Road head distance in hour from VDC center	-0.077	-.516**	-.290	-.218*	1.000	-.121
Road density (total motorable road length in Km per sq.Km)	-0.018	.343*	.089	.265*	-.121	1.000

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Source: SPSS Computation

road distance, which means that the VDCs having greater distance from road-head have less road density, which is obvious.

v) Correlation of Group/sectoral Indicators with Percentage of Area having Slope Greater than 30 Degree and Population Density

Correlation Coefficient between percentage of area having slope greater than 30 degree and other composite index (Table 6.5) shows negative relationship. The indicator has significant negative correlation with aggregate development sector, infrastructure and institutional sector. However it has higher coefficient with social sector also. This shows that the VDCs having less area with slope greater than 30 degree or in other words VDCs having more plain area are better off in aggregate development.

Similarly, population density has significant correlation with ADS, SS, IIS and WES. This shows that higher the density, better is the aggregate development and women status.

Table 6.5 Correlation Coeff. between Percentage of Area Having Slope Greater than 30 Degree, Population Density and SWI, NRS, IIS, WES and ADS

	SWI	SS	IIS	WES	ADS	Percentage of area with slope above 30 degree
Percentage of area with slope above 30 degree	-.090	-.240	-.476*	-.113	-.483*	1.000
Population density (Number of people per sq km area)	.126	.417*	.638*	.243*	.743*	-.457*

** Correlation is significant at the 0.01 level (2-tailed).
Source: SPSS computation

vi) Correlation of Other Indicators

It is found out from the correlation coefficient test with individual indicators that overall literacy is significantly correlated with other 13 indicators. From the map also it is seen the 9 VDCs of overall literacy are perfectly matching with overall composite index map.

Similarly, thatched roof household is correlated with other indicators. From map this 12 VDCs are perfectly matching with overall composite index map. Similarly, households having electricity has correlation with other indicators. The map shows that 16 VDCs having high percentage of houses having electricity are matching perfectly with the VDCs in the composite index map. Cultivated area is another indicator, which is showing better relation with the overall composite index.

This shows that overall literacy, thatched roof houses, houses having electricity and cultivated area are good indicators to reflect poverty situation in the rural area in Kaski district.

6.1.3 Spatial Analysis

Maps are prepared using ArcView, GIS. 24 maps (Figure 6.9 to Figure 6.32) are prepared using single indicator. Six sectoral composite maps (Figure 6.3 to Figure 6.8) are prepared. Similarly, one overall aggregate composite index map from all 24 indicators is prepared. All VDCs are divided into four groups by equal interval grouping technique.

From the overall composite map (Table 6.2), it is found that four VDCs are in the Good category, 11 VDCs in the fair category, 18 VDCs in the Poor category and ten are in the V. poor category. The VDCs closer to the urban areas are in Good or Fair category. The VDCs in the eastern part and north-west part of the district are falling in the V. poor category. Greater portion of these VDCs has area greater than 30-degree slope that means the terrain of the VDCs is more rugged.

VDCs which are near or adjoining to Pokhara SMC are coming in the top list of composite map of directly reflecting poverty with an exception of Namarjung and

Machhapuchre VDC. The reason behind it may be due to tourism, jobs in British Army and employment in foreign countries. VDCs around Lekhnath municipality, Kalika, Arba, Majhthana, Hansapur, Thumki and Siddha are in Very poor category. VDCs far from urban area and northern side such as Parche, Machhapuchre, Ghandruk, Dangsing and Bhadaure are also falling in this category. Other three VDCs of the eastern side of the district are also falling in this category. VDC having good development condition are near Pokhara SMC in the northern side.

From the natural resource composite map, it is seen that VDCs in the northern part of the district are falling in the V. poor or Poor category. The VDCs having less rugged terrain

Table 6.6 Distribution of VDCs in Four Categories

Good		Fair		Poor		V. poor	
VDC	Index	VDC	Index	VDC	Index	VDC	Index
Lamachaur	0.662	Lahachok	0.564	Thumakotdand	0.495	Rupakot	0.412
Hemja	0.647	Dhikurpokhari	0.562	Sardikhola	0.493	Mijuredand	0.410
Kahu	0.624	Sarangkot	0.558	Deurali	0.482	Parche	0.387
Bhalam	0.614	Puranchaur	0.540	Mauja	0.480	Dangsing	0.383
		Ghachok	0.536	Nirmalpokhari	0.478	Hansapur	0.383
		Armala	0.528	Dhampus	0.476	Sildujure	0.381
		Kristinachne	0.528	Lumle	0.470	Saimarang	0.364
		Pumdi Bhumdi	0.518	Bhadauretam	0.467	Thumki	0.363
		Bharatpokhari	0.513	Namarjung	0.460	Siddha	0.337
		kalika	0.502	Kaskikot	0.457	Ghandruk	0.335
		Dhital	0.496	Salyan	0.456		
				Chapakot	0.455		
				Rivan	0.442		
				Majhthatna	0.442		
				Bhachok	0.436		
				Machhapuchre	0.436		
				Lwangghalel	0.428		
				Arbabijaya	0.421		

Source: Overall Composite Map (Figure 6.1)

and balanced natural resources distribution that is the proportion of cultivated area, forest area and grassland are around the urban areas. The best proportion is found in two VDCs namely, Hemja and Lamachaur. These two VDCs are in the top list of other indicators also.

In social sector map, VDCs of the eastern part are in Very poor category. Ghandruk and Dangsing VDCs of the western northwest and far from the district center are also falling in this category. VDCs in the western part of and adjoining to Pokhara SMS are the good in social sector.

In infrastructure and institution sector, the best VDCs are Lamachaur, Hemja, Bhalam, Dhikurpokhari, Lahackok and Ghachok. These VDCs are closer to the Pokhara sub-metropolitan. They are in and around the national highway also. It is obvious that the infrastructure and institution sector is poor in the VDCs, which is far from both the urban area and national highway.

Women empowerment sector is also seen to be stronger in the VDCs in and around the Pokhara sub-metropolitan city. Exceptionally, three other VDCs Lumle, Dangsing and Dhampus are in Good category in this sector.

Other single indictor maps are also presented in the same way. The VDCs with high intensity line are Good and the VDCs with dots are the V. poor, for a particular indicator. In other two categories the high intensity line is the better.

The findings from the statistical analysis and from the map are almost same. But the statistical analysis is difficult to understand for those who do not have background of mathematics. Additionally, people believe what they see but not what is proved from mathematical models or formula. That means the local planners if they see maps, they believe about the development level of their area.

6.1.4 Spatial Analysis of Sectoral Results Based on Composite Indices

Comparison is done by two sets of indicators

1) Social wellbeing sector vis-à-vis other sectoral indicator

Social wellbeing sector values are arranged in descending order with respective VDCs (Table 6.7) and other sectoral values are arranged in the same order of the social wellbeing index in the table. The category (Good, Fair, Poor, V. poor) as ascribed in the map, where the value of the indicator falls is also given in the next column to respective value of indices.

2) Natural resource sector vis-à-vis other sectoral indicators

Natural resource sector indices are arranged in descending order with VDCs (Table 6.8) and other sectoral values are arranged in the same order of natural resources sector in the table. Here also the category in which the value of the indicator falls is given in the next column to the index values.

From Table 6.7 and 6.8, Table 6.9 is prepared where relation of social wellbeing index and natural resources sector vis-à-vis other sectors are presented. The matching of VDCs in these category (Good, Fair, Poor and V. poor) is seen here.

- Perfectly match - VDCs common in two selected sectoral indicator in same category,
- 1 above or below – suppose a VDC is Good in one indicator and fair in another indicator or if one VDC is fair in one indicator and poor in another indicator,
- Exception - If both cases are not applicable, for example if a VDC is Very poor in one indicator and good in another indicator

For example, in Table 6.7, Hemja (S. no 2) falls in Good category in social wellbeing index, it is in the good category in aggregate development index, so in the Table 6.9 their relation appears as "Perfect match". Similarly, the same VDC has fair relation with women empowerment aspect, so the Table shows "1 above or below" relation with social wellbeing index. If these two cases are not applicable, exception is appearing.

From the Table 6.9, it is seen that social wellbeing index is matching with 11 aggregate development index perfectly and matching 20 with 1 below or above category. But still there are 12 exceptional cases. Its relation with natural resources is better where

exceptional cases are only 5, in comparison with other group indicators where, exceptional cases with social sector is 13, infrastructure is 14 and women empowerment aspect is 12.

Table 6.9 Matching of Social Well-being Index and Natural Resources Sector Vis-à-vis Other Group Indicators

	SWI	NRS	SS	IIS	WES	ADS
SWI						
- Perfect matching		17	14	12	11	11
- Matching 1 above or below Category		21	13	17	20	20
- Exception		5	16	14	12	12
NRS						
- Perfect matching	17		12	15	11	18
- Matching 1 above or below Category	21		22	25	18	21
- Exception	5		9	3	14	5

Source: Table 6.7 and 6.8

The feeble relationship of social wellbeing index with other development sectors shows that either development factors are not matching with the requirements of the poor people or people have not taken advantages of the development factors.

From the Table 6.9, it can also be seen that natural resources sector is more or less matching with all other sector. The exceptional cases are fewer in comparison with the matching categories. This shows that natural resources play vital role in poverty and development in the hill district of Nepal. The better the natural resources condition, the better is the development and lesser is the poverty.

Table 6.7 Composite Indices Value of VDCs, Arranged in Descending Order for Social Wellbeing Index

S.no	VDC	Social wellbeing Index (CI_1)		Nat. Res. Sect (CI_2)		Social sector (CI_3)		Infrastr. Sector (CI_4)		Women emp. (CI_5)		Aggregate Dev. Index (CI_6)		Overall Composite Index (CI_0)	
		Value	Status	Value	Status	Value	Status	Value	Status	Value	Status	Value		Value	Status
1	Dhital	0.786	Good	0.314	V.poor	0.486	Poor	0.318	Poor	0.575	Fair	0.384	Poor	0.496	Fair
2	Hemja	0.699	Good	0.571	Good	0.655	Good	0.687	Good	0.625	Fair	0.600	Good	0.647	Good
3	Namarjung	0.698	Good	0.273	V.poor	0.429	Poor	0.353	Poor	0.546	Fair	0.360	Poor	0.460	Poor
4	Bhadauretamagi	0.677	Good	0.451	Poor	0.416	Poor	0.245	Poor	0.544	Fair	0.343	V. poor	0.467	Poor
5	kalika	0.660	Fair	0.412	Poor	0.515	Fair	0.325	Poor	0.595	Fair	0.398	Poor	0.502	Fair
6	Machhapuchre	0.659	Fair	0.394	Poor	0.414	Poor	0.210	V.poor	0.505	Fair	0.348	V. poor	0.436	Poor
7	Sardikhola	0.655	Fair	0.362	Poor	0.583	Fair	0.254	Poor	0.613	Fair	0.381	Poor	0.493	Poor
8	Bharatpokhari	0.645	Fair	0.468	Fair	0.543	Fair	0.276	Poor	0.635	Fair	0.404	Poor	0.513	Fair
9	Bhachok	0.612	Fair	0.332	V.poor	0.463	Poor	0.217	V.poor	0.556	Fair	0.326	V. poor	0.436	Poor
10	Rivan	0.608	Fair	0.414	Poor	0.259	V.poor	0.477	Fair	0.451	Fair	0.337	V. poor	0.442	Poor
11	Mijuredanda	0.608	Fair	0.361	Poor	0.393	V.poor	0.222	V.poor	0.465	Fair	0.297	V. poor	0.410	V. poor
12	Mauja	0.598	Fair	0.422	Poor	0.425	Poor	0.534	Good	0.419	Poor	0.407	Poor	0.480	Poor
13	Dhikurpokhari	0.591	Fair	0.470	Fair	0.398	V.poor	0.730	Good	0.623	Fair	0.513	Fair	0.562	Fair
14	Kaskikot	0.587	Fair	0.482	Fair	0.399	V.poor	0.389	Fair	0.430	Poor	0.353	V. poor	0.457	Poor
15	Kristinachnechau	0.579	Fair	0.454	Poor	0.650	Good	0.297	Poor	0.659	Good	0.440	Poor	0.528	Fair
16	Kahu	0.577	Fair	0.517	Fair	0.837	Good	0.517	Fair	0.672	Good	0.579	Good	0.624	Good
17	Bhalam	0.575	Fair	0.485	Fair	0.685	Good	0.647	Good	0.675	Good	0.575	Good	0.614	Good
18	Puranchaur	0.559	Fair	0.430	Poor	0.592	Good	0.446	Fair	0.673	Good	0.466	Fair	0.540	Fair
19	Thumakotdanda	0.549	Fair	0.373	Poor	0.549	Fair	0.428	Fair	0.577	Fair	0.425	Poor	0.495	Fair
20	Thumki	0.543	Poor	0.367	Poor	0.440	Poor	0.467	Fair	0.000	V. poor	0.301	V. poor	0.363	V. poor
21	Majhthatna	0.528	Poor	0.438	Poor	0.304	V.poor	0.312	Poor	0.626	Fair	0.353	V. poor	0.442	Poor
22	Sarangkot	0.522	Poor	0.509	Fair	0.715	Good	0.377	Fair	0.667	Good	0.495	Fair	0.558	Fair
23	Lamachaur	0.521	Poor	0.641	Good	0.641	Good	0.836	Good	0.670	Good	0.643	Good	0.662	Good
24	Hansapur	0.501	Poor	0.385	Poor	0.179	V.poor	0.463	Fair	0.388	Poor	0.310	V. poor	0.383	V. poor
25	Arbabijaya	0.499	Poor	0.417	Poor	0.442	Poor	0.219	V.poor	0.529	Fair	0.331	V. poor	0.421	Poor
26	Armala	0.493	Poor	0.420	Poor	0.688	Good	0.377	Fair	0.663	Good	0.468	Fair	0.528	Fair
27	Lwangghalel	0.480	Poor	0.333	V.poor	0.455	Poor	0.399	Fair	0.475	Fair	0.367	Poor	0.428	Poor
28	Parche	0.475	Poor	0.291	V.poor	0.414	Poor	0.346	Poor	0.409	Poor	0.331	V. poor	0.387	V. poor
29	Lahachok	0.469	Poor	0.502	Fair	0.594	Good	0.690	Good	0.566	Fair	0.549	Good	0.564	Fair
30	Pumdi Bhumdi	0.464	Poor	0.485	Fair	0.607	Good	0.459	Fair	0.576	Fair	0.480	Fair	0.518	Fair
31	Nirmalpokhari	0.457	Poor	0.481	Fair	0.527	Fair	0.333	Poor	0.591	Fair	0.428	Poor	0.478	Poor
32	Deurali	0.439	Poor	0.378	Poor	0.559	Fair	0.422	Fair	0.610	Fair	0.443	Poor	0.482	Poor

33	Chapakot	0.429	Poor	0.354	V.poor	0.715	Good	0.222	Poor	0.556	Fair	0.392	Poor	0.455	Poor
34	Dangsing	0.426	Poor	0.347	V.poor	0.428	Poor	0.046	V.poor	0.670	Good	0.269	V. poor	0.383	V. poor
35	Ghachok	0.423	V. poor	0.493	Fair	0.568	Fair	0.635	Good	0.561	Fair	0.544	Fair	0.536	Fair
36	Ghandruk	0.406	V. poor	0.266	V.poor	0.268	V.poor	0.200	V.poor	0.533	Fair	0.262	V. poor	0.335	V. poor
37	Lumle	0.396	V. poor	0.289	V.poor	0.541	Fair	0.257	Poor	0.868	Good	0.405	Poor	0.470	Poor
38	Rupakot	0.367	V. poor	0.390	Poor	0.392	V.poor	0.433	Fair	0.478	Fair	0.384	Poor	0.412	V. poor
39	Salyan	0.360	V. poor	0.480	Fair	0.512	Fair	0.321	Poor	0.606	Fair	0.399	Poor	0.456	Poor
40	Siddha	0.360	V. poor	0.395	Poor	0.167	V.poor	0.407	Fair	0.356	Poor	0.273	V. poor	0.337	V. poor
41	Sildujure	0.336	V. poor	0.380	Poor	0.345	V.poor	0.408	Fair	0.436	Fair	0.334	V. poor	0.381	V. poor
42	Saimarang	0.321	V. poor	0.352	V.poor	0.437	Poor	0.199	V.poor	0.510	Fair	0.310	V. poor	0.364	V. poor
43	Dhampus	0.311	V. poor	0.352	V.poor	0.643	Good	0.403	Fair	0.671	Good	0.465	Fair	0.476	Poor

Source: Computed from Transformed Values of the Indicators and from Mapping

Table 6.8 Composite Indices Value of VDCs, Arranged in Descending Order for Natural Resource Sector

S.no	VDC	Social Wellbeing Index (CI_1)		Nat. Res. Sect (CI_2)		Social sector (CI_3)		Infrastr. Sector (CI_4)		Women emp. (CI_5)		Aggregate Dev. Index (CI_6)		Overall Composite Index (CI_0)	
		Value	Status	Value	status	Value	Status	Value	Status	Value	Status	Value	Status	Value	Status
1	Lamachaur	0.521	Poor	0.641	Good	0.641	Good	0.836	Good	0.670	Good	0.643	Good	0.662	Good
2	Hemja	0.699	Good	0.571	Good	0.655	Good	0.687	Good	0.625	Fair	0.600	Good	0.647	Good
3	Kahu	0.577	Fair	0.517	Fair	0.837	Good	0.517	Fair	0.672	Good	0.579	Good	0.624	Good
4	Sarangkot	0.522	Poor	0.509	Fair	0.715	Good	0.377	Fair	0.667	Good	0.495	Fair	0.558	Fair
5	Lahachok	0.469	Poor	0.502	Fair	0.594	Good	0.690	Good	0.566	Fair	0.549	Good	0.564	Fair
6	Ghachok	0.423	V. poor	0.493	Fair	0.568	Fair	0.635	Good	0.561	Fair	0.544	Fair	0.536	Fair
7	Pumdi Bhumdi	0.464	Poor	0.485	Fair	0.607	Good	0.459	Fair	0.576	Fair	0.480	Fair	0.518	Fair
8	Bhalam	0.575	Fair	0.485	Fair	0.685	Good	0.647	Good	0.675	Good	0.575	Good	0.614	Good
9	Kaskikot	0.587	Fair	0.482	Fair	0.399	V.poor	0.389	Fair	0.430	Poor	0.353	V. poor	0.457	Poor
10	Nirmalpokhari	0.457	Poor	0.481	Fair	0.527	Fair	0.333	Poor	0.591	Fair	0.428	Poor	0.478	Poor
11	Salyan	0.360	V. poor	0.480	Fair	0.512	Fair	0.321	Poor	0.606	Fair	0.399	Poor	0.456	Poor
12	Dhikurpokhari	0.591	Fair	0.470	Fair	0.398	V.poor	0.730	Good	0.623	Fair	0.513	Fair	0.562	Fair
13	Bharatpokhari	0.645	Fair	0.468	Fair	0.543	Fair	0.276	Poor	0.635	Fair	0.404	Poor	0.513	Fair
14	Kristinachnechau	0.579	Fair	0.454	Poor	0.650	Good	0.297	Poor	0.659	Good	0.440	Poor	0.528	Fair
15	Bhadauretamagi	0.677	Good	0.451	Poor	0.416	Poor	0.245	Poor	0.544	Fair	0.343	V. poor	0.467	Poor
16	Majhthatna	0.528	Poor	0.438	Poor	0.304	V.poor	0.312	Poor	0.626	Fair	0.353	V. poor	0.442	Poor
17	Puranchaur	0.559	Fair	0.430	Poor	0.592	Good	0.446	Fair	0.673	Good	0.466	Fair	0.540	Fair
18	Mauja	0.598	Fair	0.422	Poor	0.425	Poor	0.534	Good	0.419	Poor	0.407	Poor	0.480	Poor
19	Armala	0.493	Poor	0.420	Poor	0.688	Good	0.377	Fair	0.663	Good	0.468	Fair	0.528	Fair
20	Arbabijaya	0.499	Poor	0.417	Poor	0.442	Poor	0.219	V.poor	0.529	Fair	0.331	V. poor	0.421	Poor
21	Rivan	0.608	Fair	0.414	Poor	0.259	V.poor	0.477	Fair	0.451	Fair	0.337	V. poor	0.442	Poor
22	kalika	0.660	Fair	0.412	Poor	0.515	Fair	0.325	Poor	0.595	Fair	0.398	Poor	0.502	Fair
23	Siddha	0.360	V. poor	0.395	Poor	0.167	V.poor	0.407	Fair	0.356	Poor	0.273	V. poor	0.337	V. poor
24	Machhapuchre	0.659	Fair	0.394	Poor	0.414	Poor	0.210	V.poor	0.505	Fair	0.348	V. poor	0.436	Poor
25	Rupakot	0.367	V. poor	0.390	Poor	0.392	V.poor	0.433	Fair	0.478	Fair	0.384	Poor	0.412	V. poor
26	Hansapur	0.501	Poor	0.385	Poor	0.179	V.poor	0.463	Fair	0.388	Poor	0.310	V. poor	0.383	V. poor
27	Sildujure	0.336	V. poor	0.380	Poor	0.345	V.poor	0.408	Fair	0.436	Fair	0.334	V. poor	0.381	V. poor
28	Deurali	0.439	Poor	0.378	Poor	0.559	Fair	0.422	Fair	0.610	Fair	0.443	Poor	0.482	Poor
29	Thumakotdanda	0.549	Fair	0.373	Poor	0.549	Fair	0.428	Fair	0.577	Fair	0.425	Poor	0.495	Fair
30	Thumki	0.543	Poor	0.367	Poor	0.440	Poor	0.467	Fair	0.000	V. poor	0.301	V. poor	0.363	V. poor
31	Sardikhola	0.655	Fair	0.362	Poor	0.583	Fair	0.254	Poor	0.613	Fair	0.381	Poor	0.493	Poor
32	Mijuredanda	0.608	Fair	0.361	Poor	0.393	V.poor	0.222	V.poor	0.465	Fair	0.297	V. poor	0.410	V. poor
33	Chapakot	0.429	Poor	0.354	V.poor	0.715	Good	0.222	Poor	0.556	Fair	0.392	Poor	0.455	Poor

34	Dhampus	0.311	V. poor	0.352	V.poor	0.643	Good	0.403	Fair	0.671	Good	0.465	Fair	0.476	Poor
35	Saimarang	0.321	V. poor	0.352	V.poor	0.437	Poor	0.199	V.poor	0.510	Fair	0.310	V. poor	0.364	V. poor
36	Dangsing	0.426	Poor	0.347	V.poor	0.428	Poor	0.046	V.poor	0.670	Good	0.269	V. poor	0.383	V. poor
37	Lwangghalel	0.480	Poor	0.333	V.poor	0.455	Poor	0.399	Fair	0.475	Fair	0.367	Poor	0.428	Poor
38	Bhachok	0.612	Fair	0.332	V.poor	0.463	Poor	0.217	V.poor	0.556	Fair	0.326	V. poor	0.436	Poor
39	Dhital	0.786	Good	0.314	V.poor	0.486	Poor	0.318	Poor	0.575	Fair	0.384	Poor	0.496	Fair
40	Parche	0.475	Poor	0.291	V.poor	0.414	Poor	0.346	Poor	0.409	Poor	0.331	V. poor	0.387	V. poor
41	Lumle	0.396	V. poor	0.289	V.poor	0.541	Fair	0.257	Poor	0.868	Good	0.405	Poor	0.470	Poor
42	Namarjung	0.698	Good	0.273	V.poor	0.429	Poor	0.353	Poor	0.546	Fair	0.360	Poor	0.460	Poor
43	Ghandruk	0.406	V. poor	0.266	V.poor	0.268	V.poor	0.200	V.poor	0.533	Fair	0.262	V. poor	0.335	V. poor

Source: Computed from the Transformed Value of Indicators and Mapping

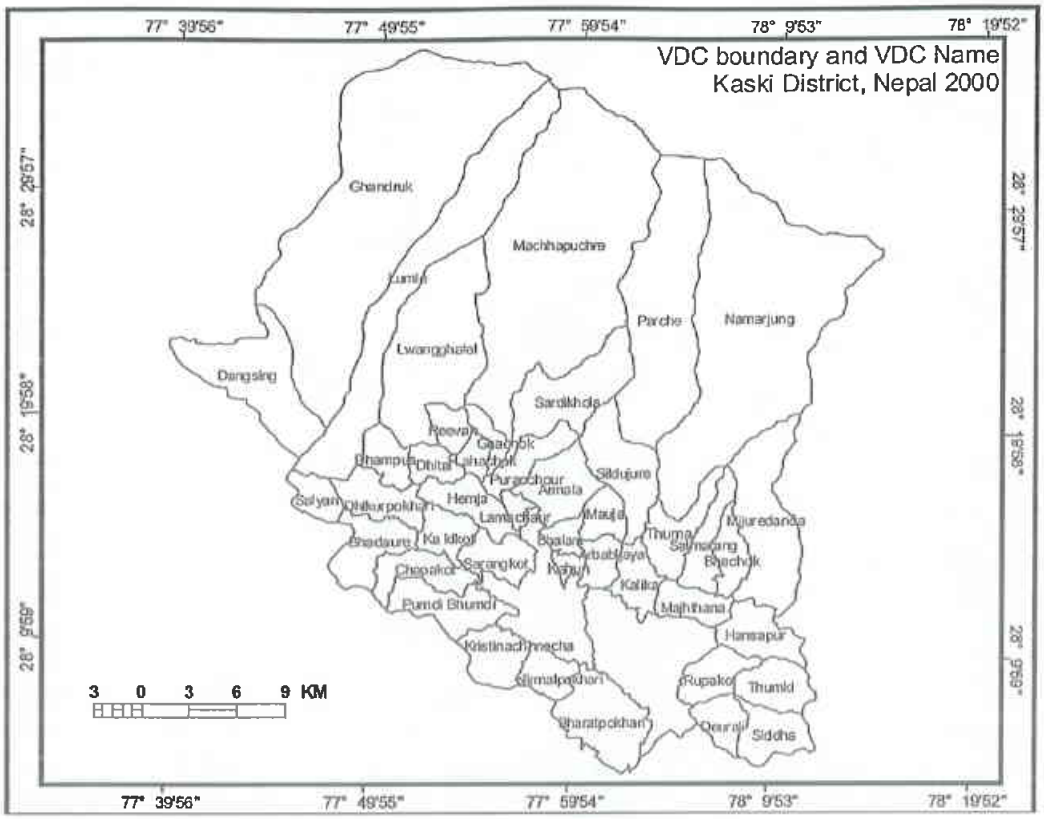


Figure 6.1 VDCs Boundary and VDC Name

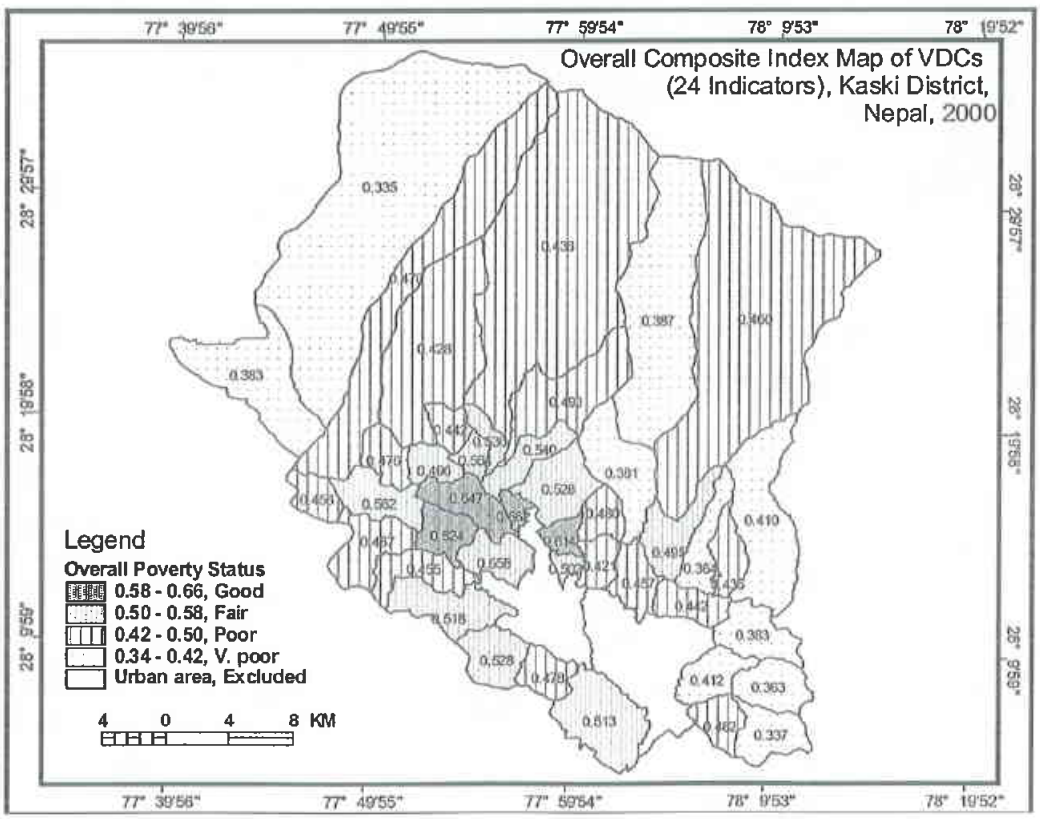


Figure 6.2 Status of VDCs by Overall Composite Index

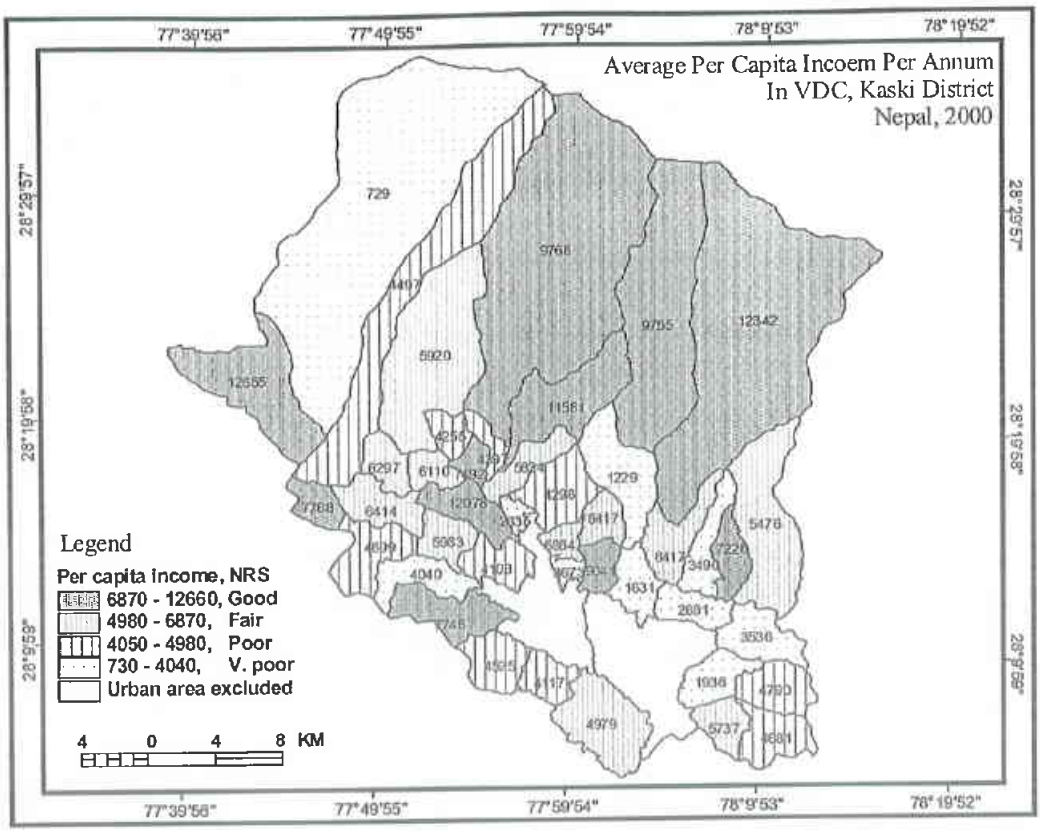


Figure 6.3 Average Per Capita Income of VDCs

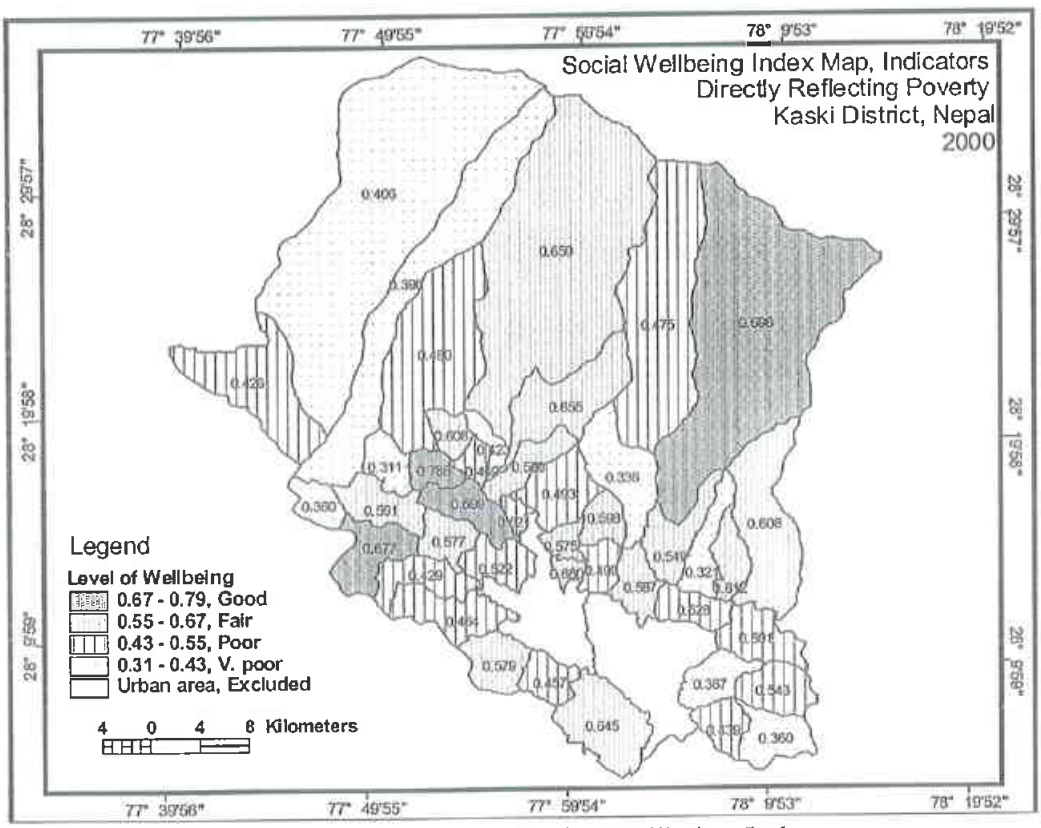


Figure 6.4 Composite Index Map of Social Wellbeing Index

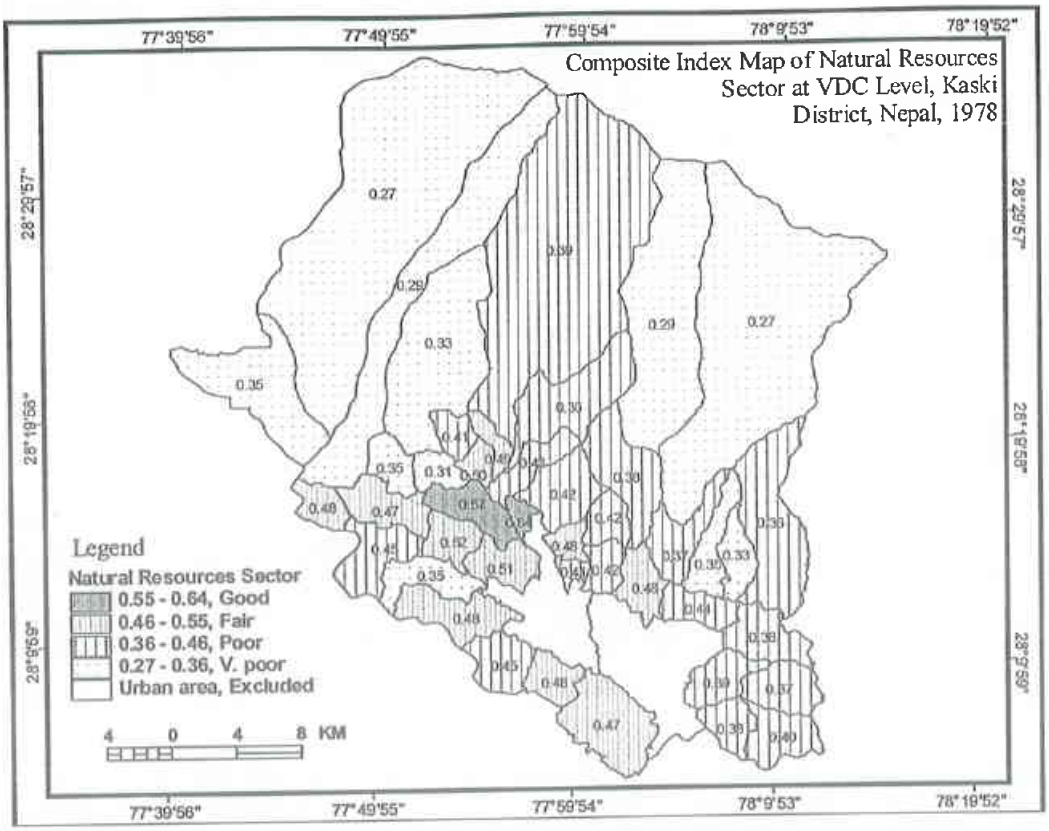


Figure 6.5 Composite Index Map of Natural Resource Sector

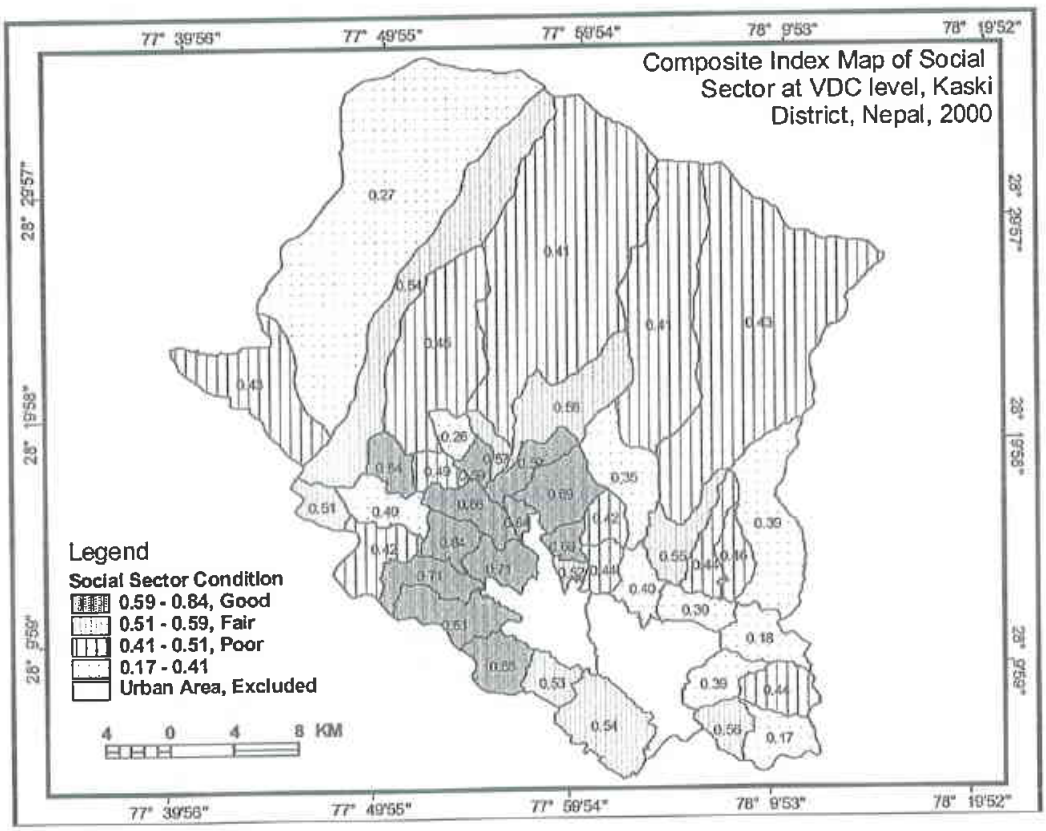


Figure 6.6 Composite Index Map of Social Sector

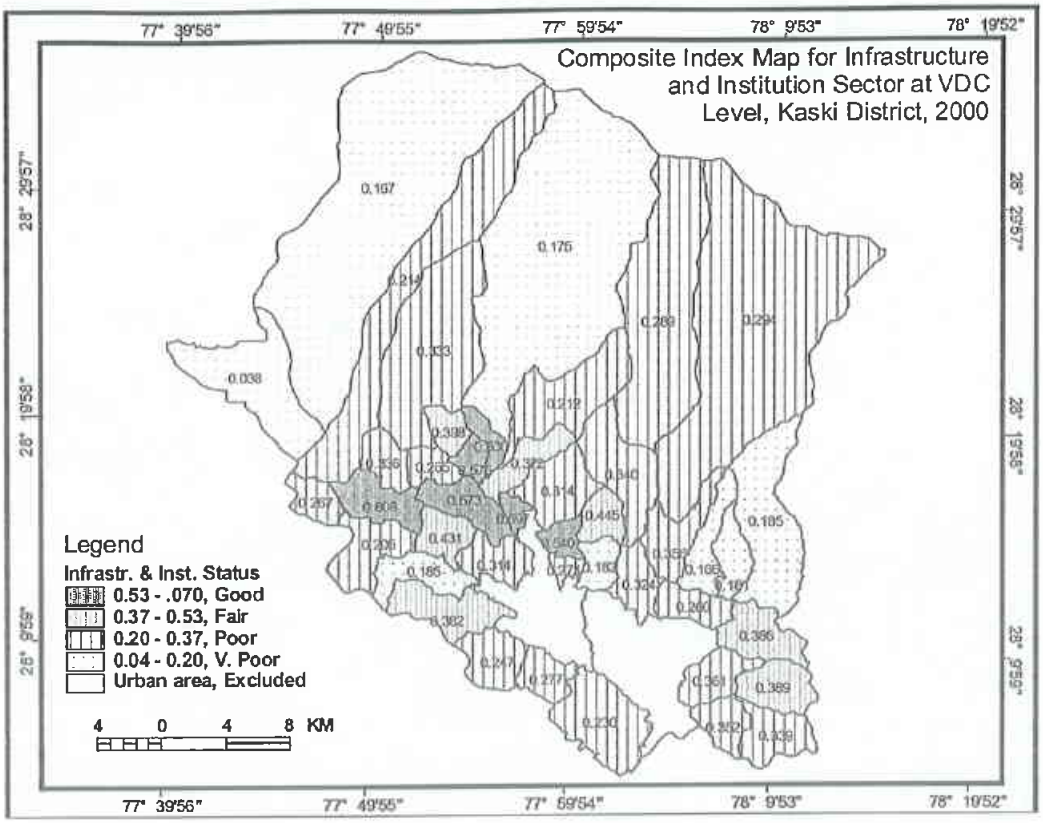


Figure 6.7 Composite Index Map of VDCs in Infrastr. and Institutional Sector

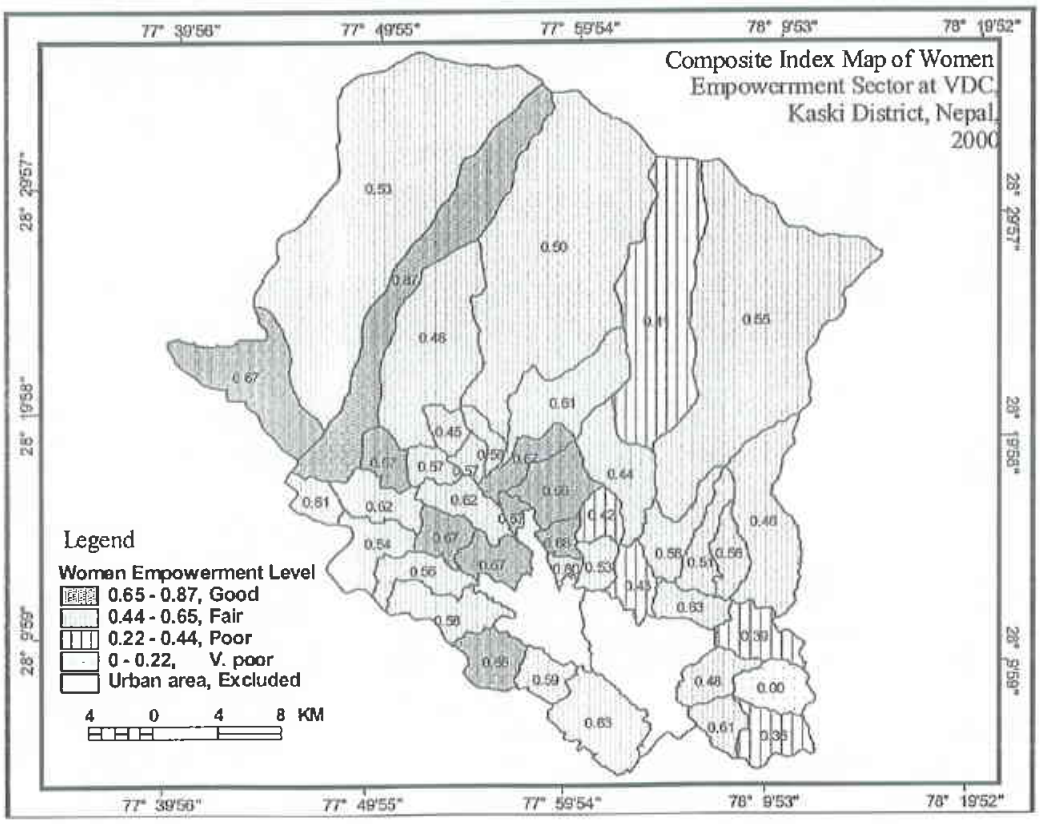


Figure 6.8 Composite Index Map of Women Empowerment Aspect

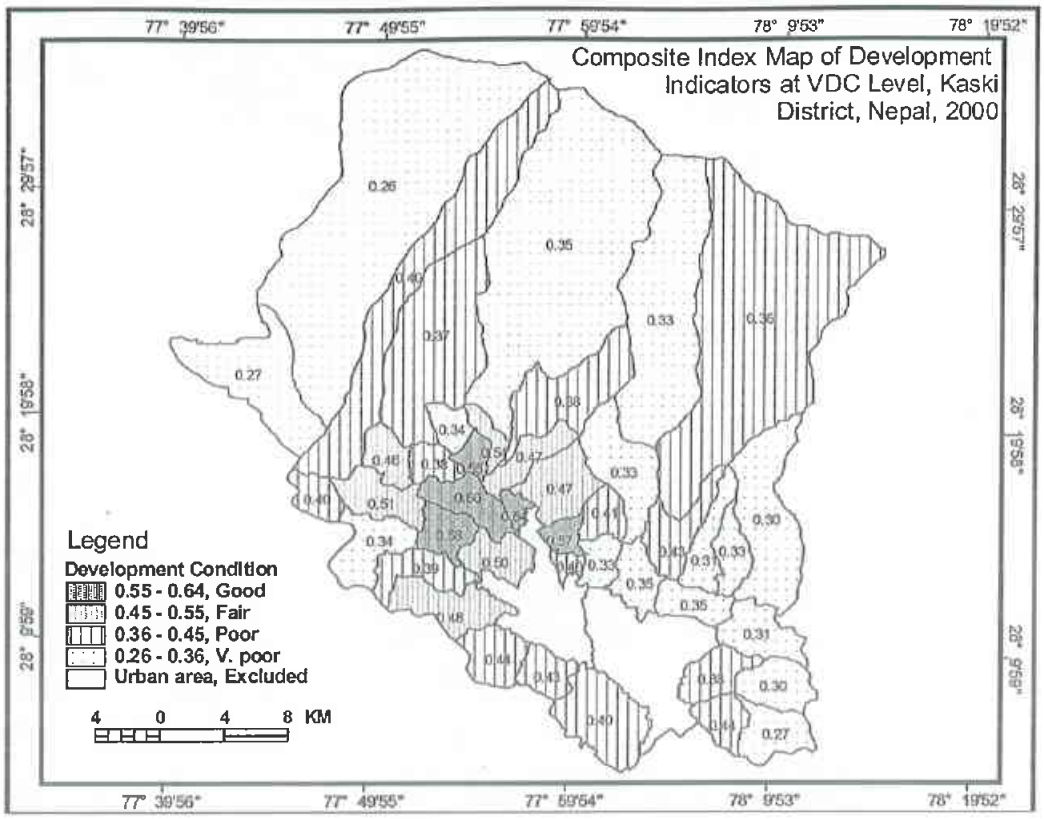


Figure 6.9 Aggregate Development Index Map

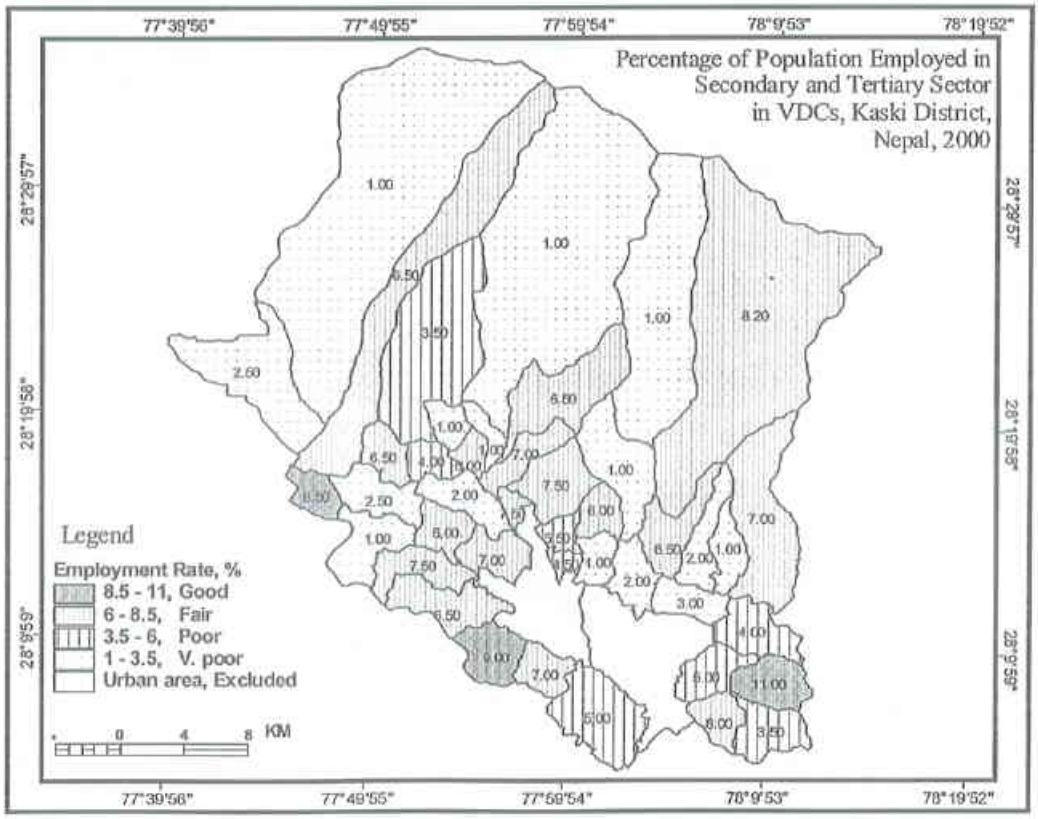


Figure 6.10. Employment Status of VDC from Secondary or Tertiary Sector

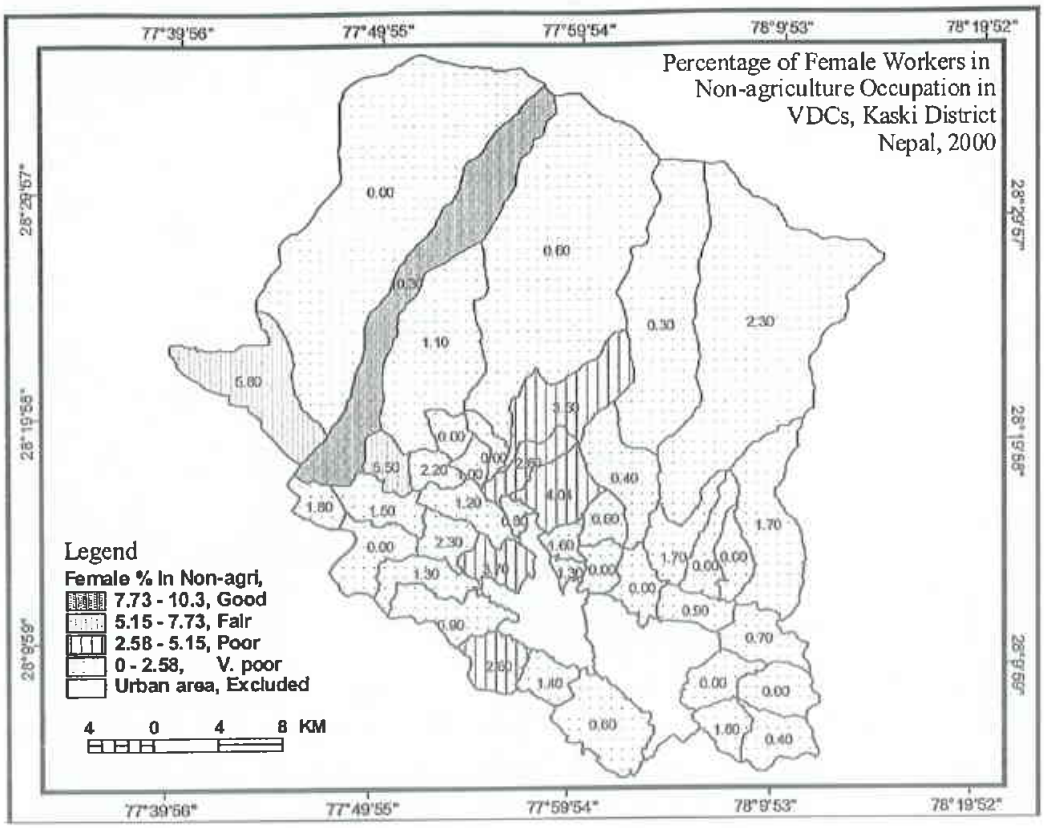


Figure 6.11. Percentage of Women in Non-agricultural Occupation

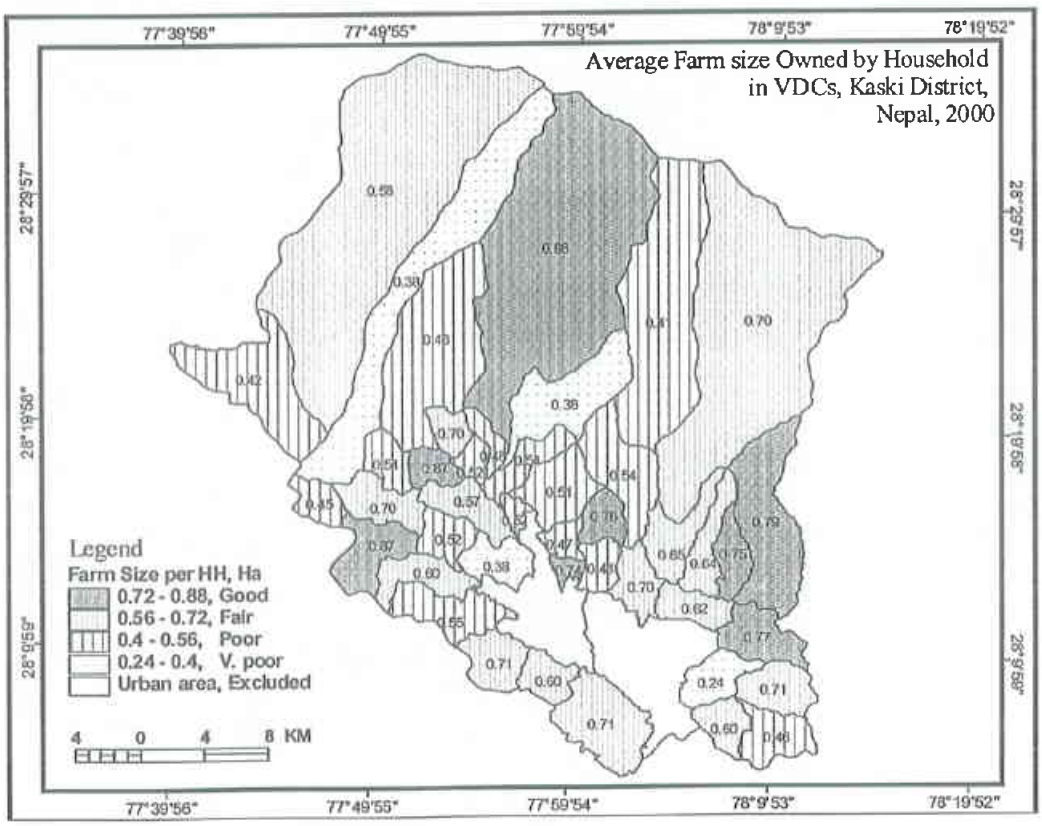


Figure 6.12 Average Household Farm size in Ha.

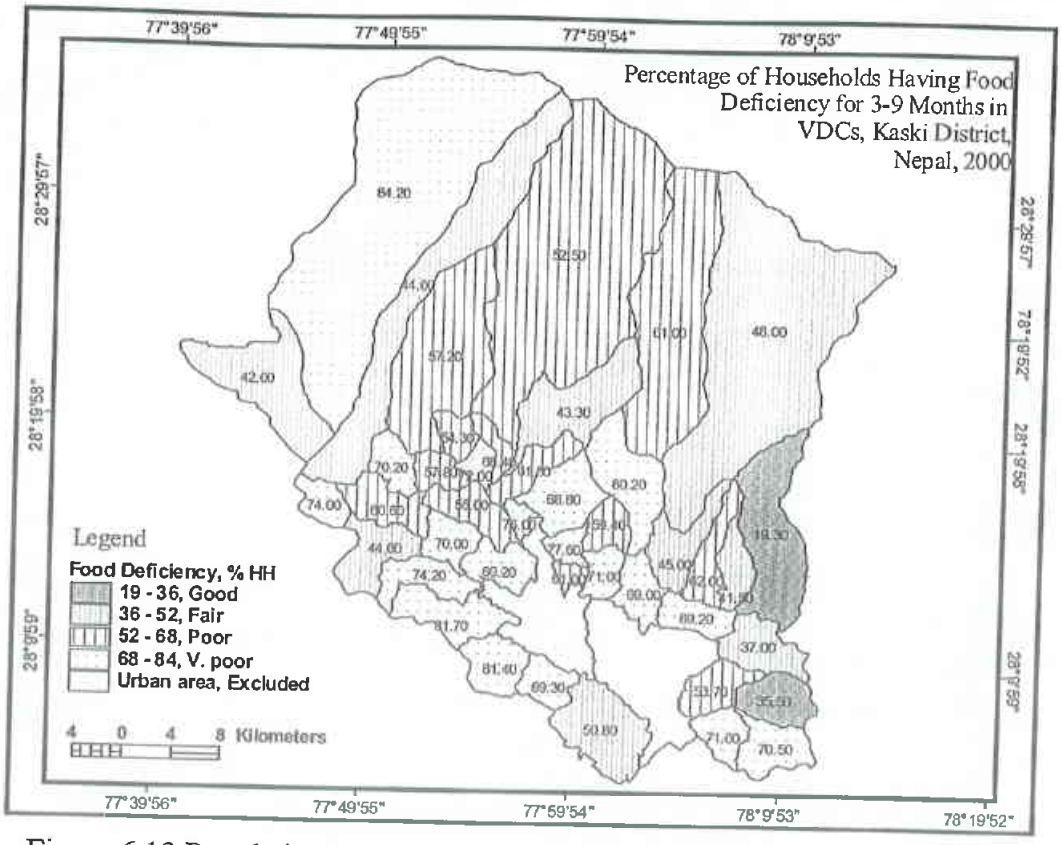


Figure 6.13 Population Having Food Deficit from 3 to 9 Months

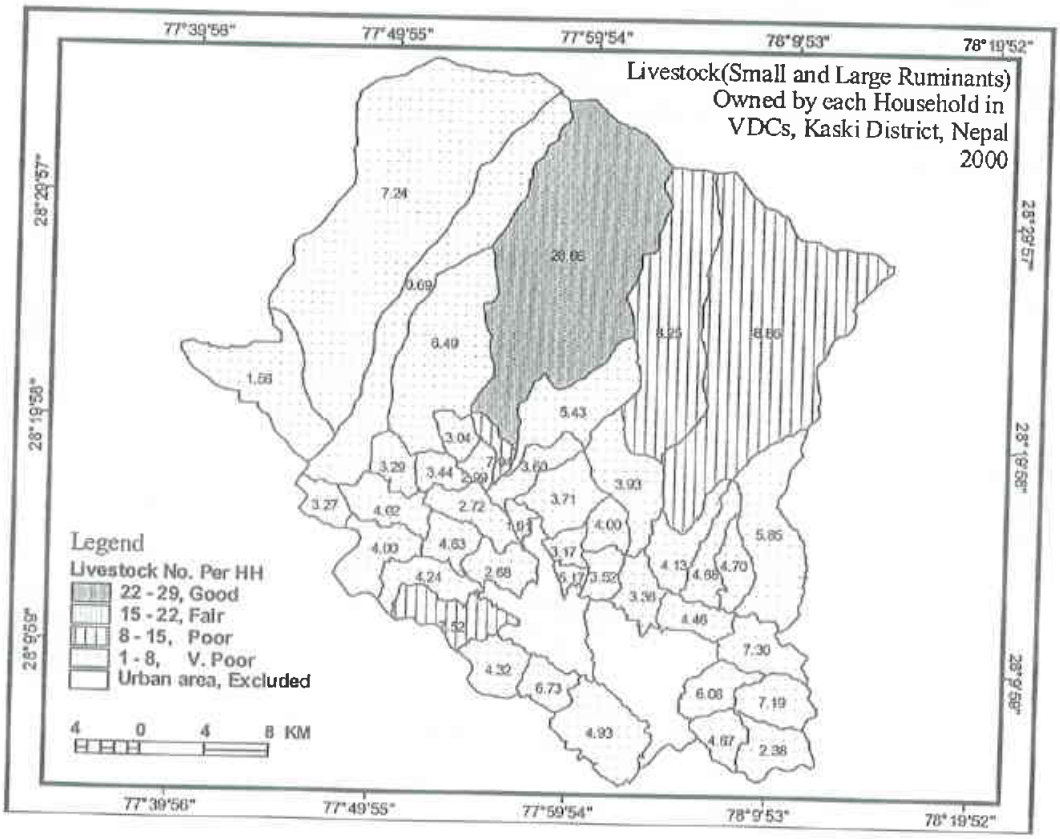


Figure 6.14 Number of Livestock per Household

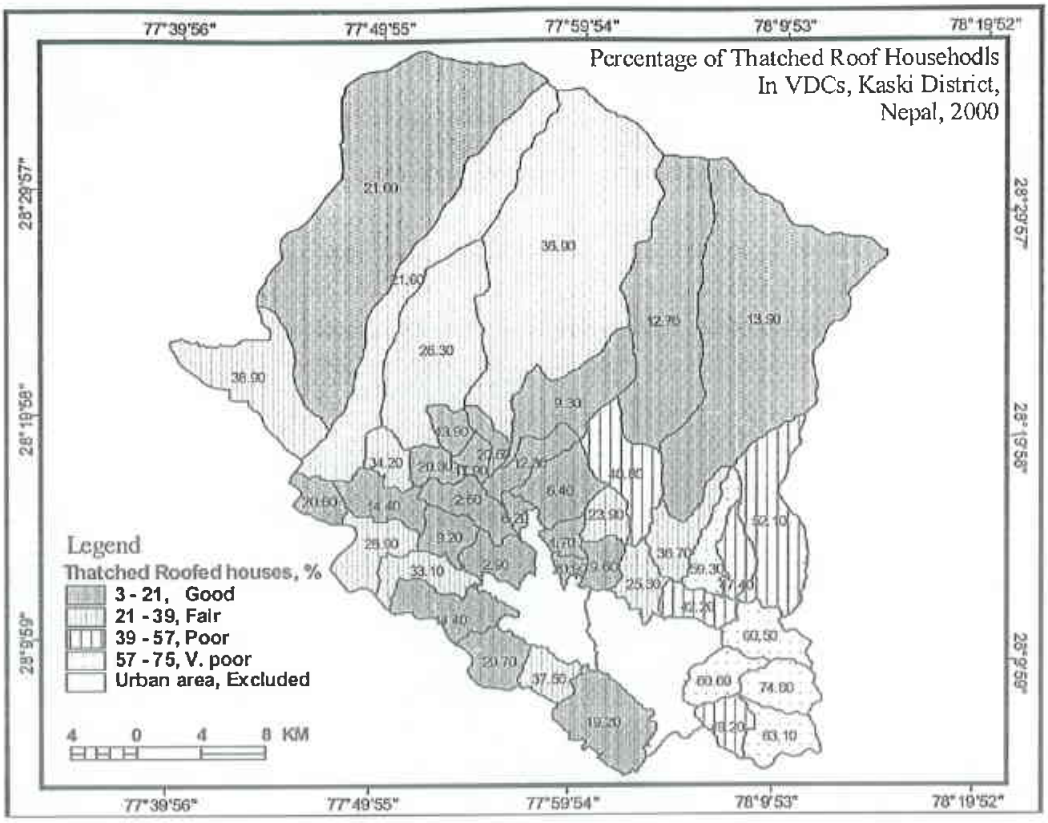


Figure 6.15 Percentage of Thatched Roofed Households

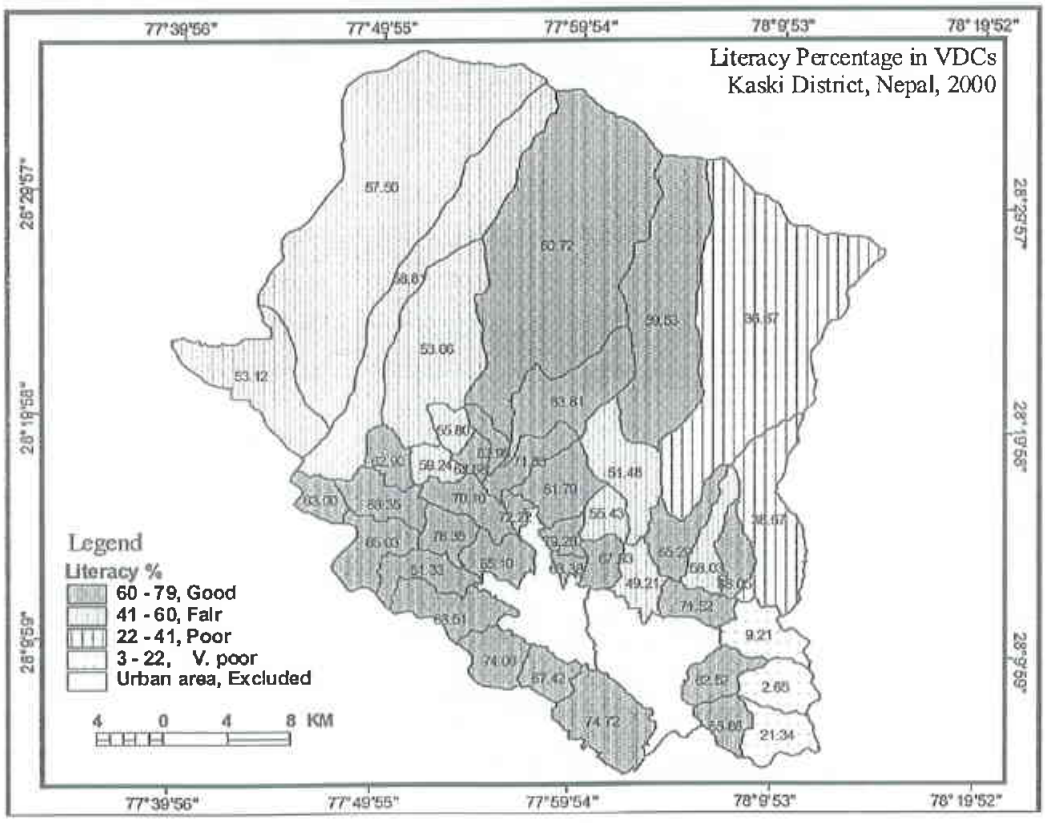


Figure 6.16 Percentage of Literate people

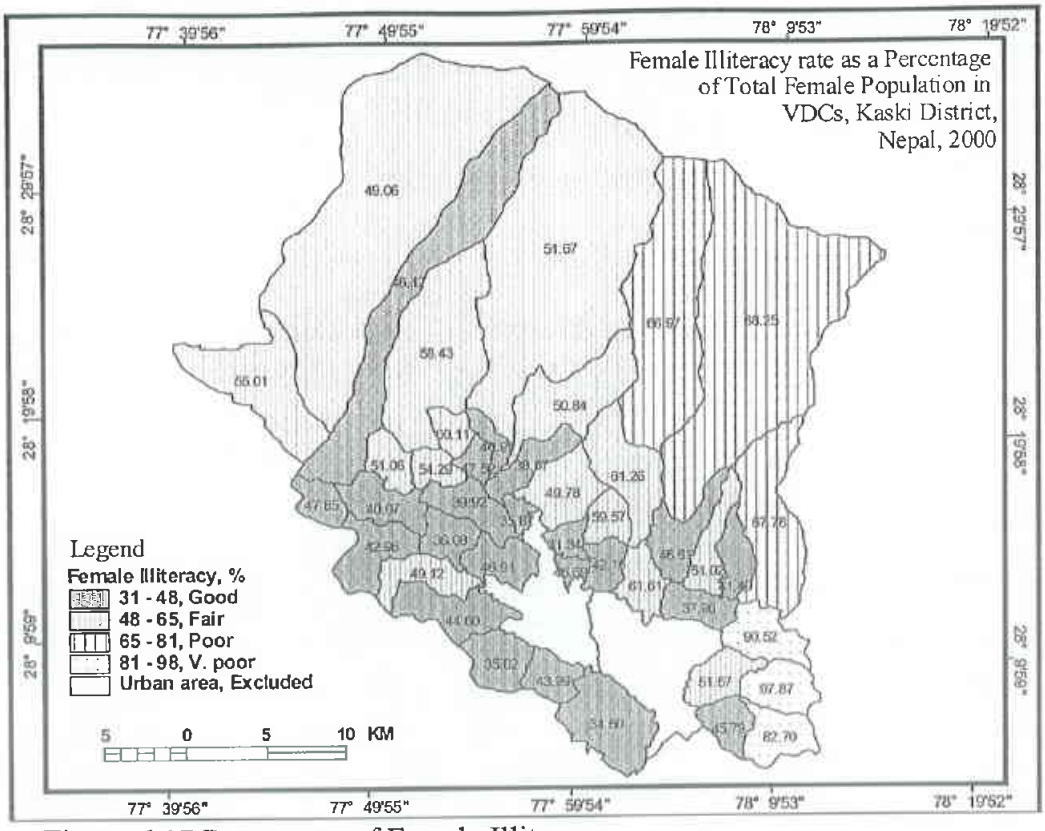


Figure 6.17 Percentage of Female Illiteracy

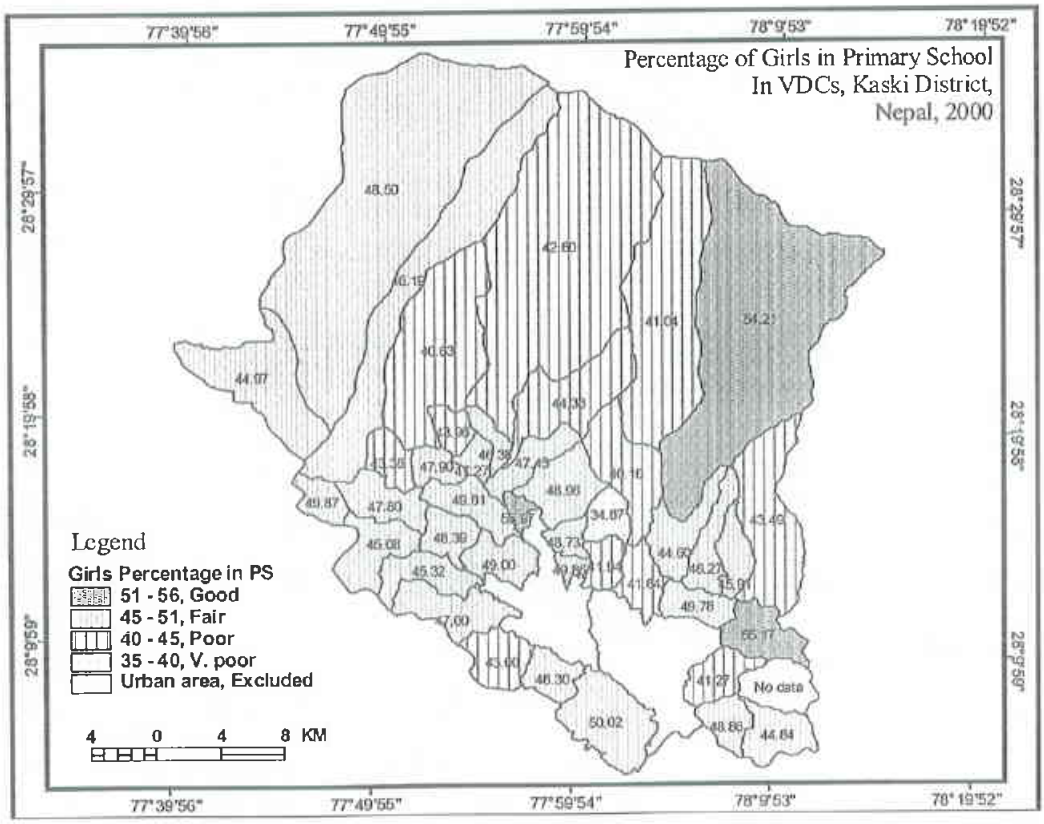


Figure 6.18 Percentage of Girls in Primary School

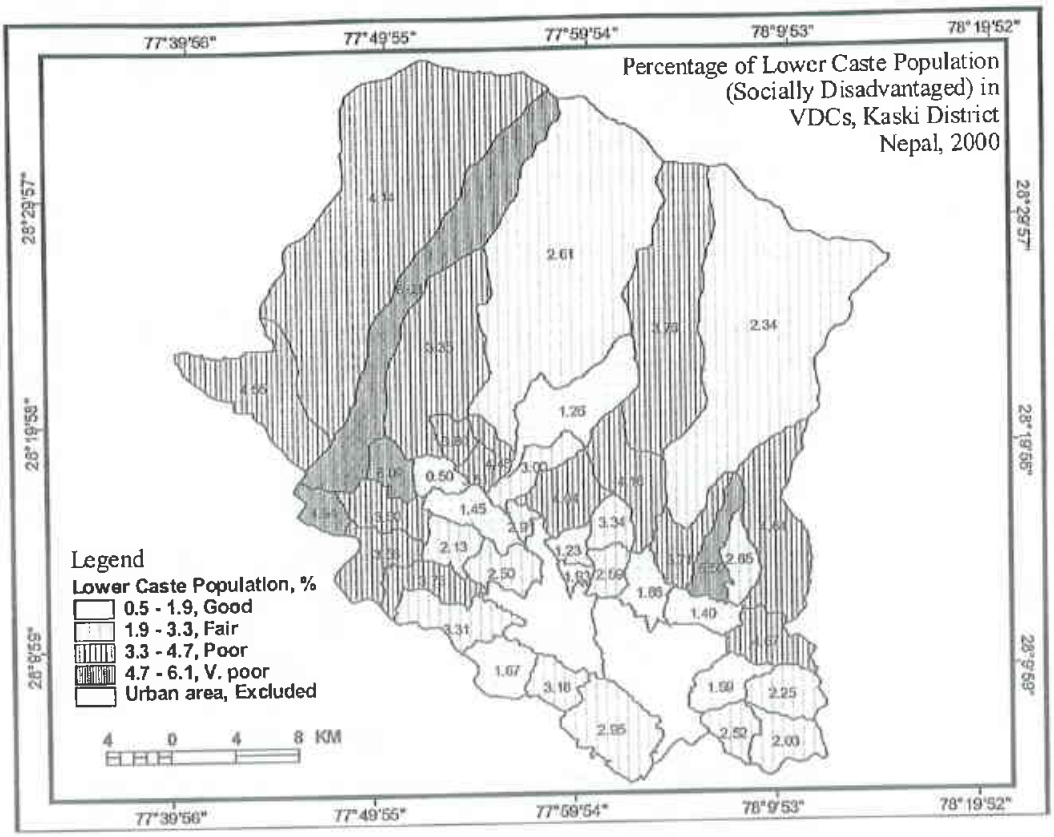


Figure 6.19 Percentage of Lower Caste Population

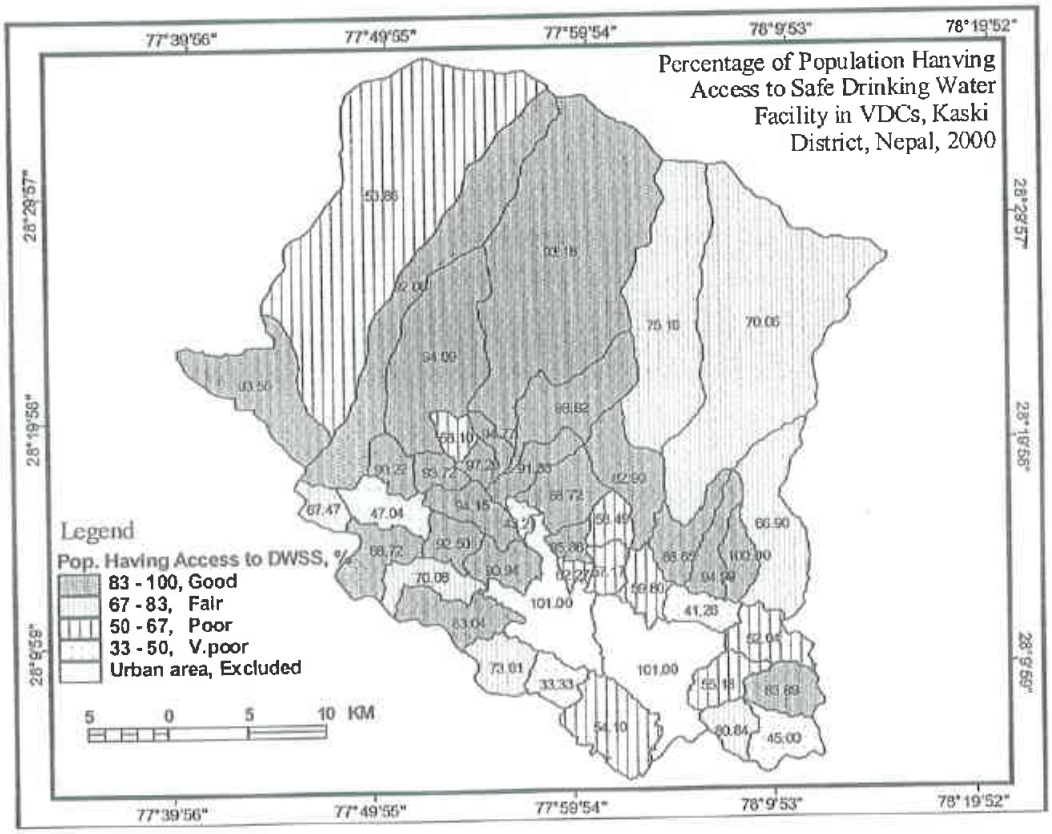


Figure 6.20 Percentage of Population Having Safe Drinking Water Access

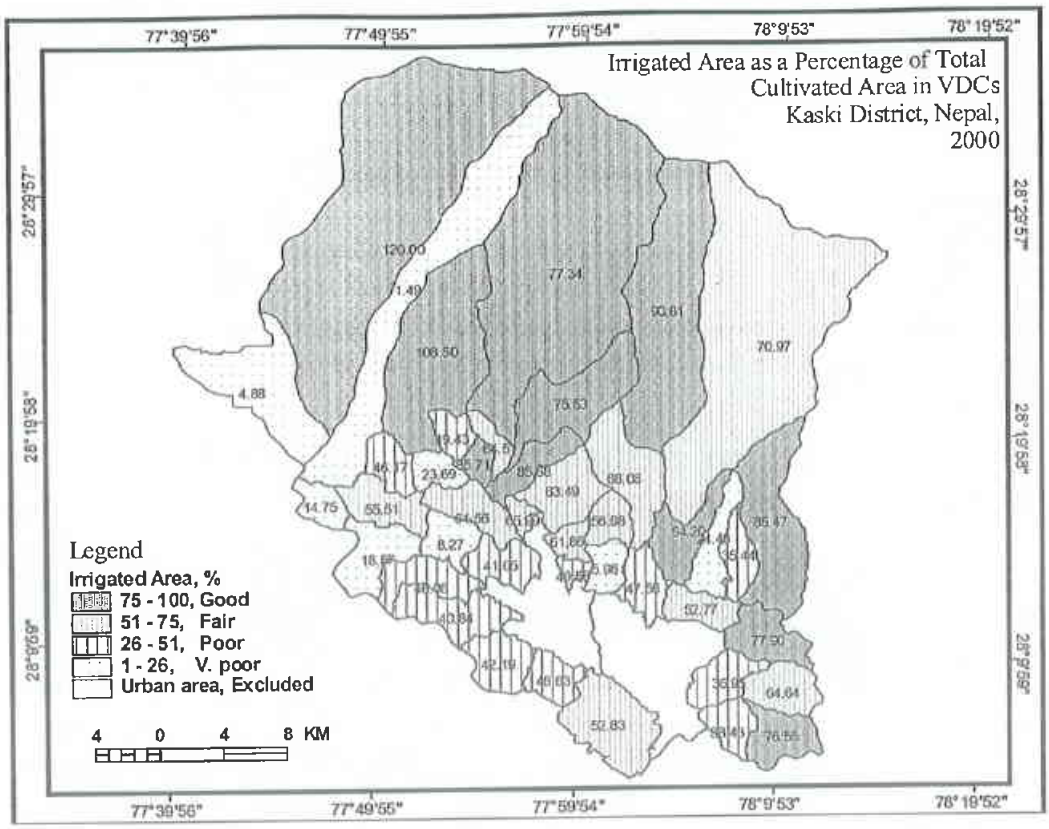


Figure 6.21 Percentage of Irrigated Area

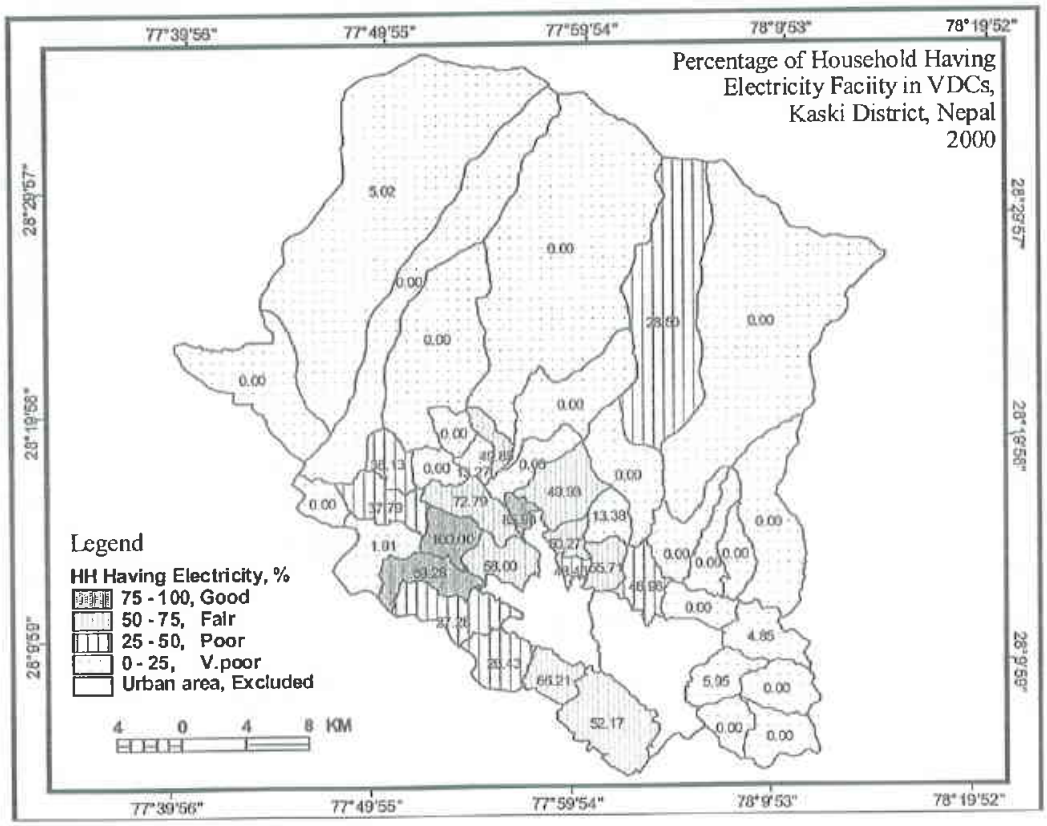


Figure 6.22 Percentage of Household Having Electricity Facility

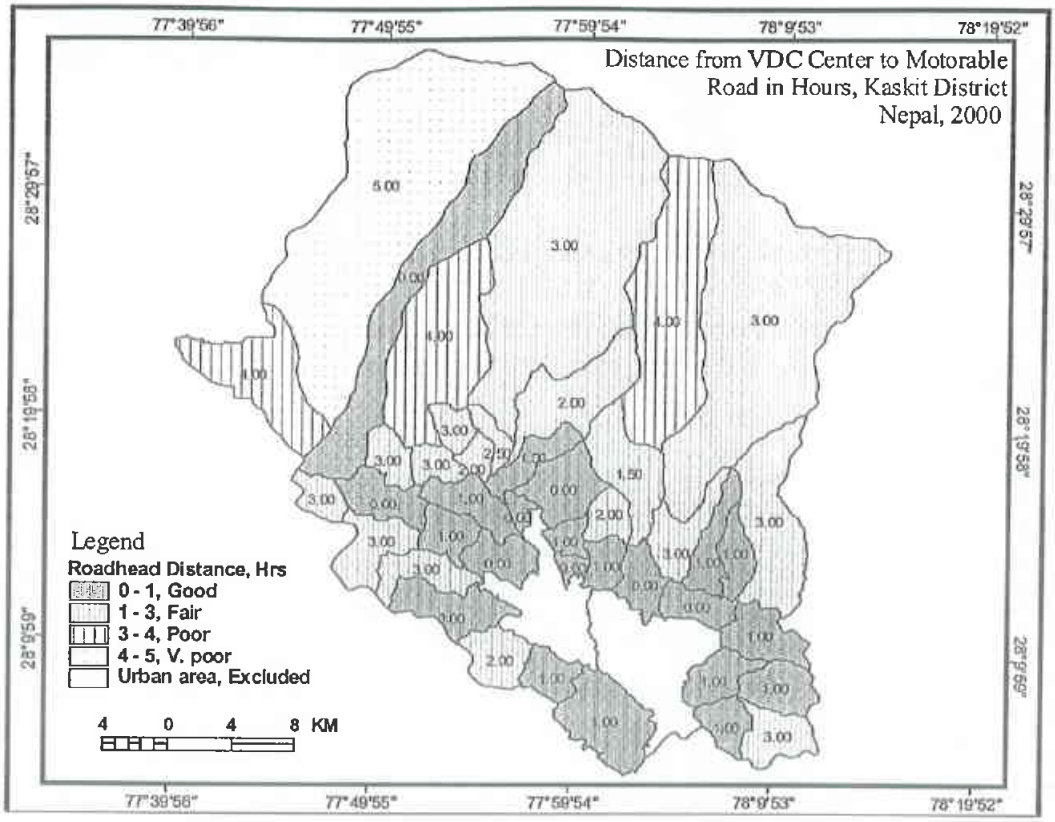


Figure 6.23 Distance of Roadhead from VDC Center

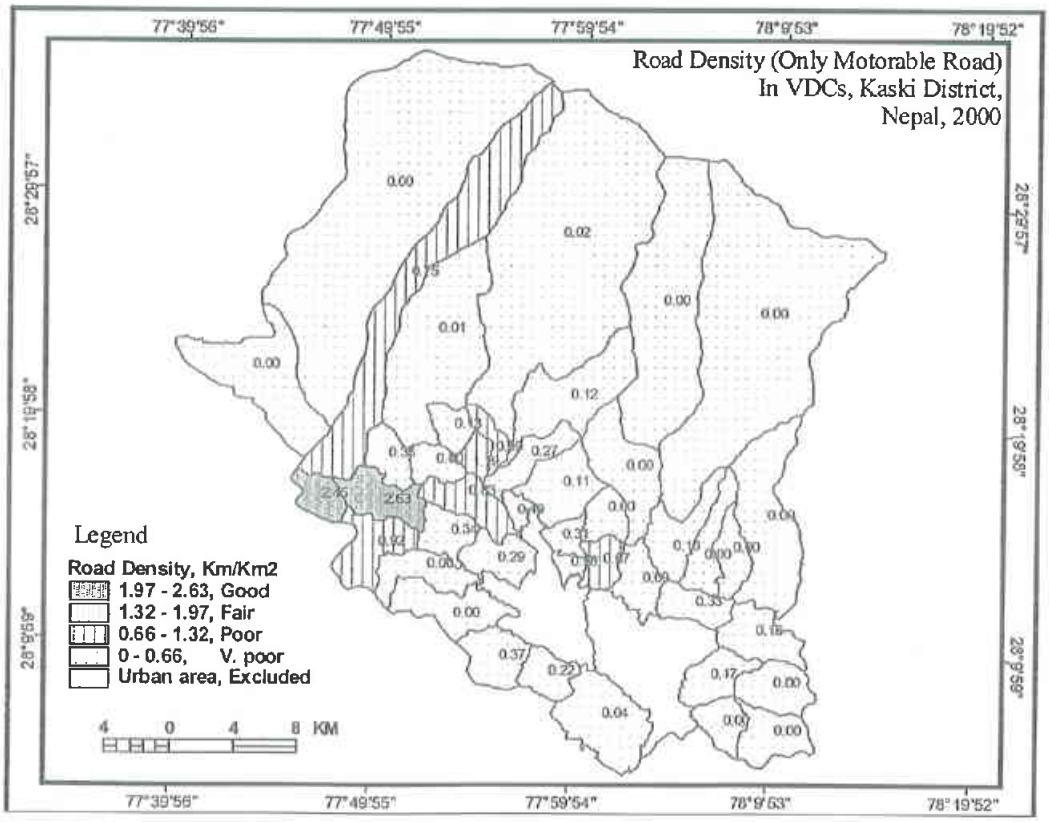


Figure 6.24 Road Density in the VDC

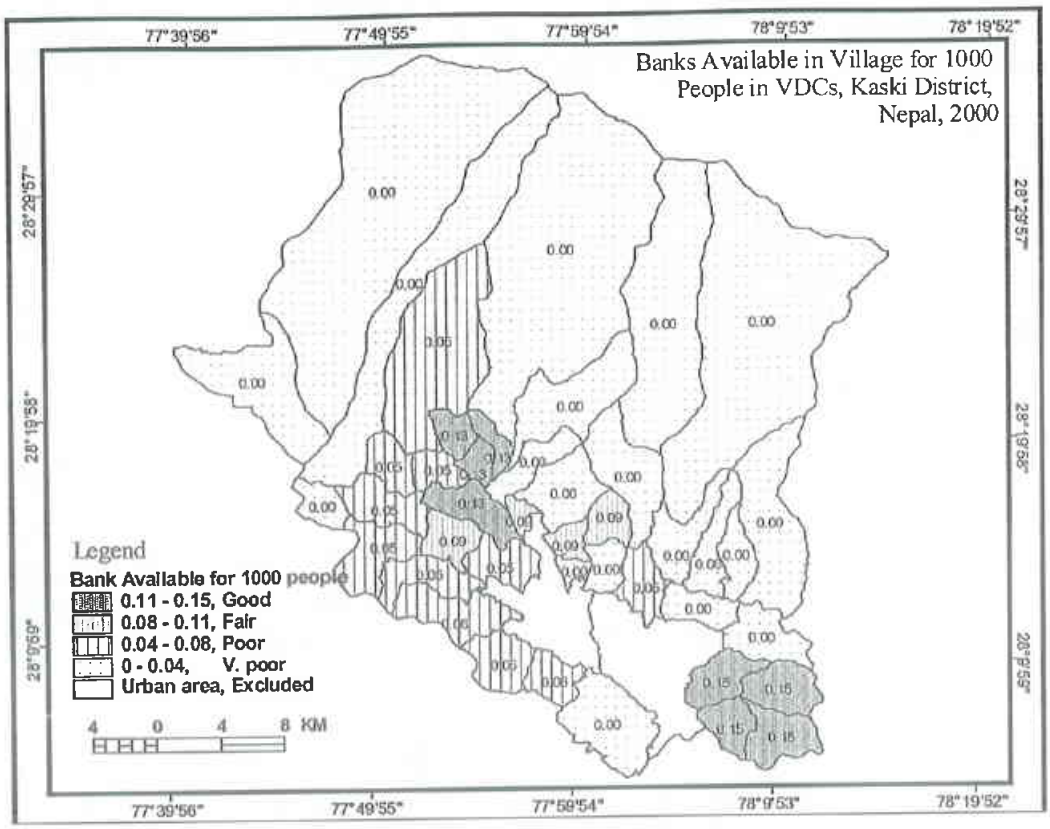


Figure 6.25 Banking Units Per 1000 People

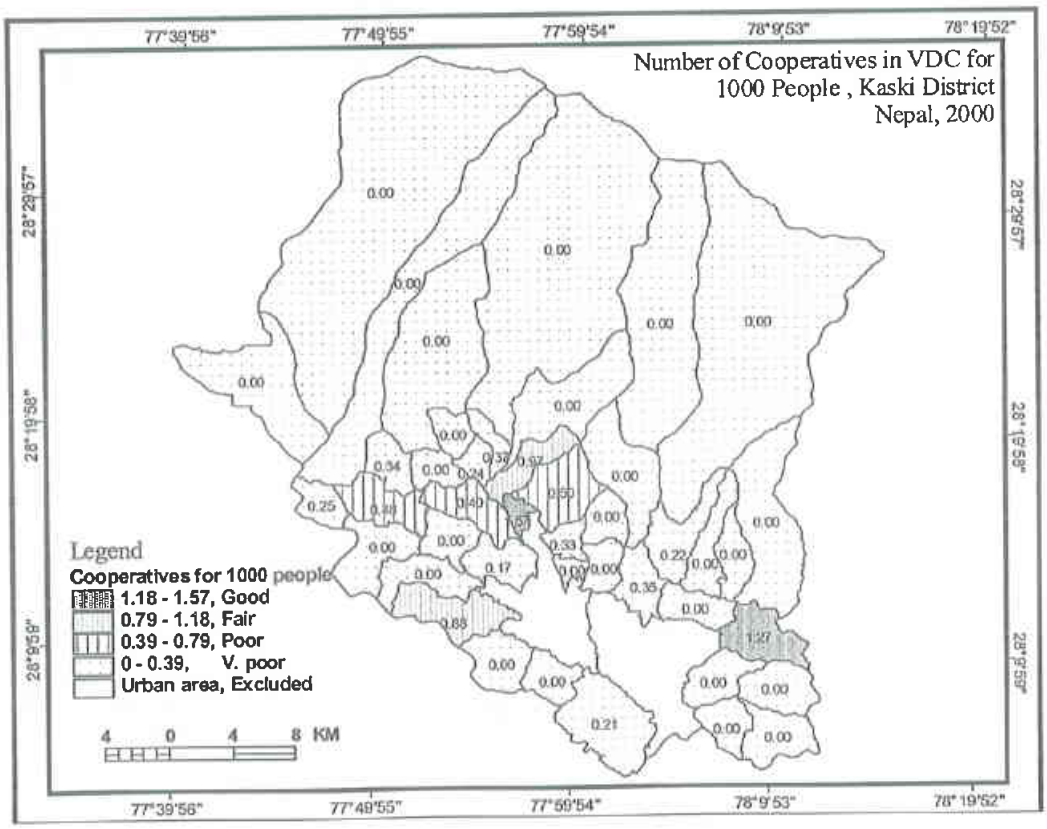


Figure 6.26 Cooperatives Per 1000 People in VDC

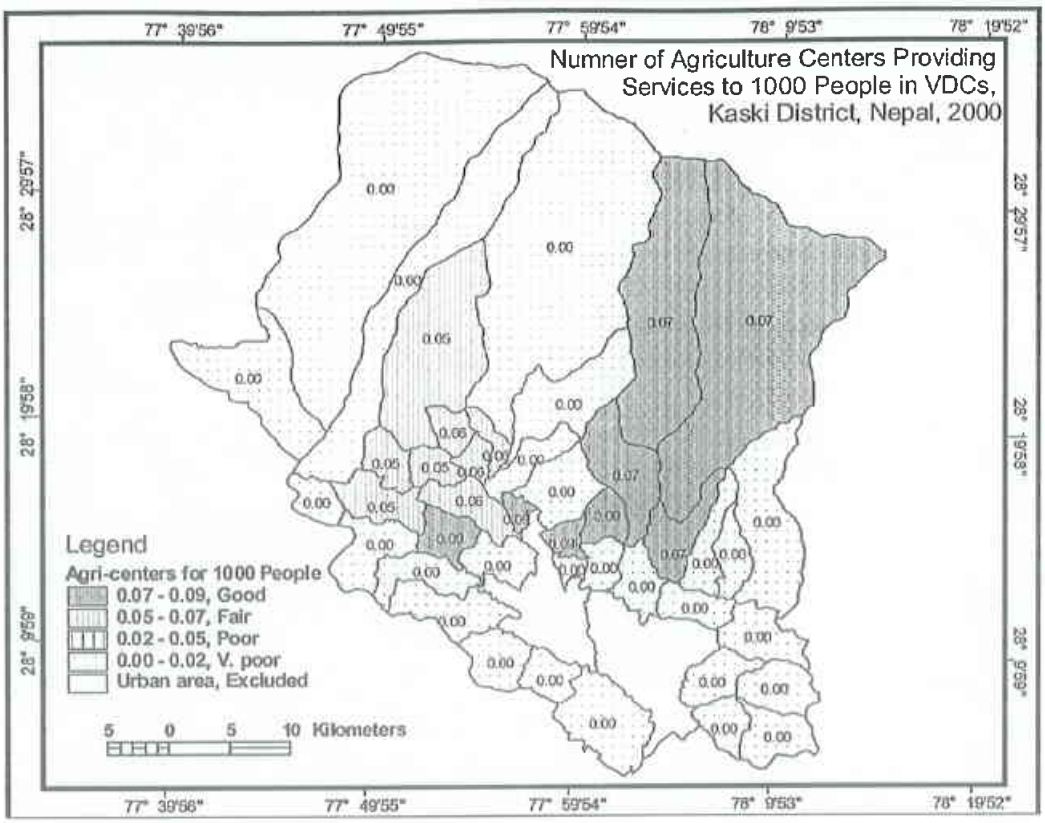


Figure 6.27 Agriculture Centers Per 1000 People

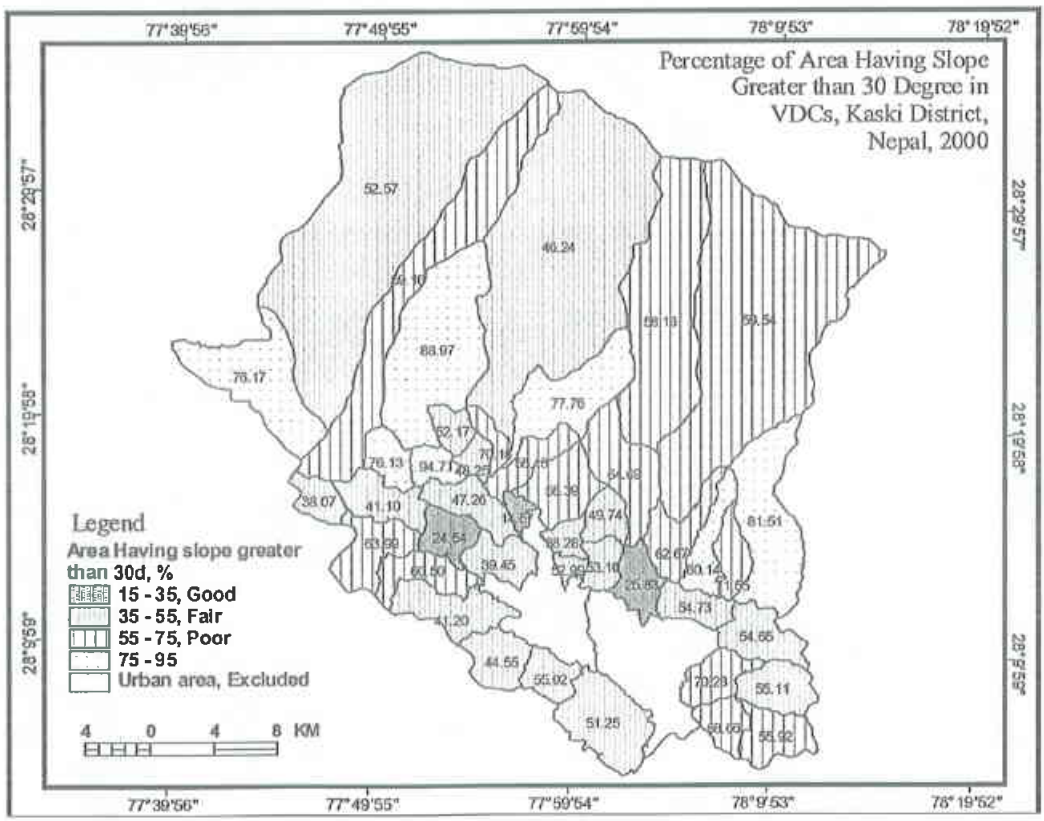


Figure 2.28 Percentage of Area Having Slope Greater Than 30 Degree

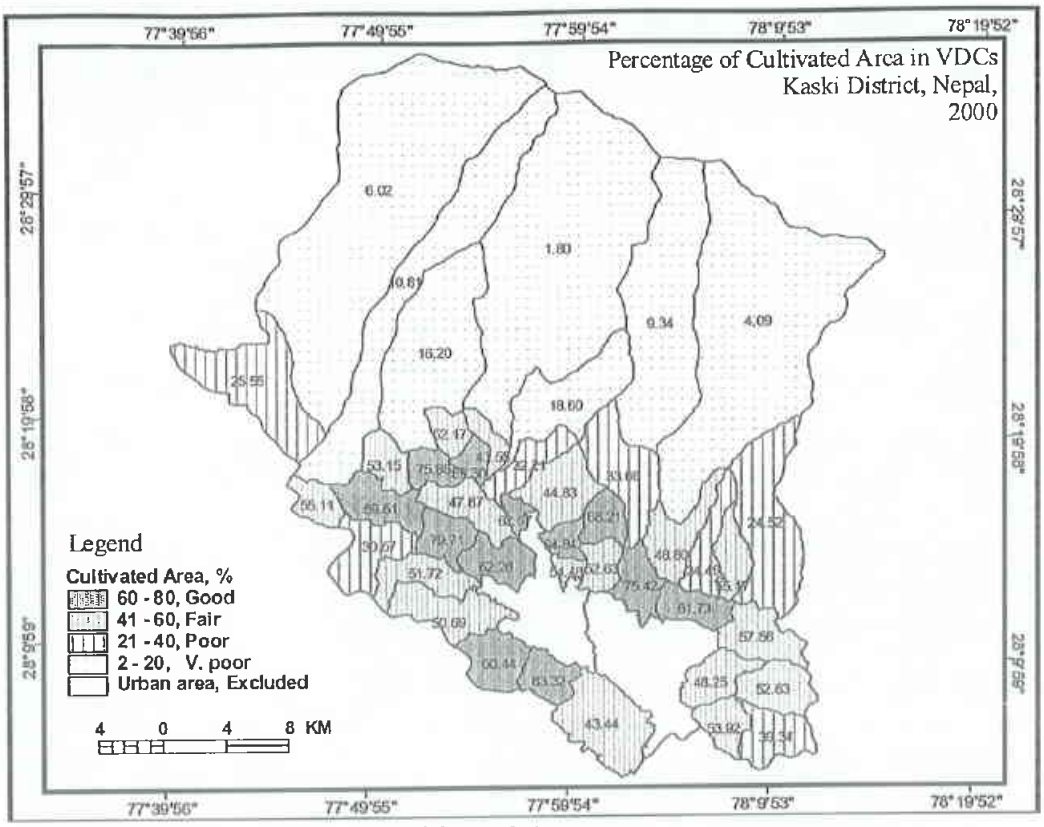


Figure 6.29 Percentage of Cultivated Area

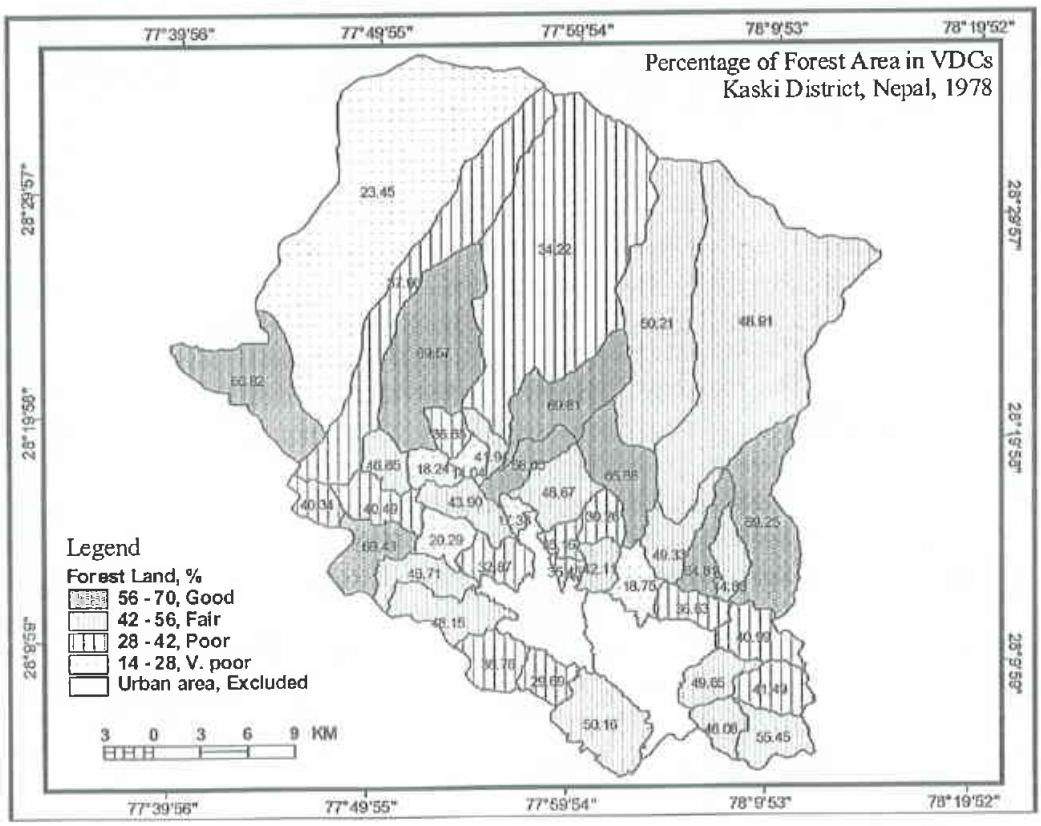


Figure 6.30 Percentage of Forest Area

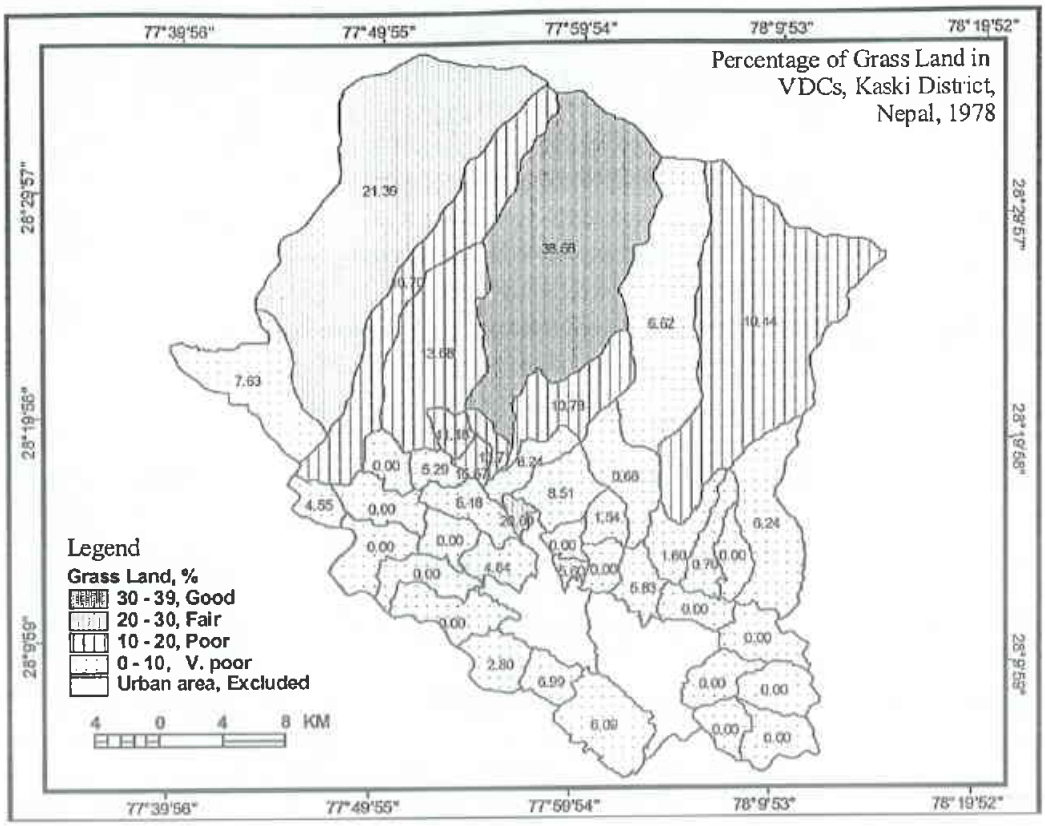


Figure 2.31 Percentage of Grass Land

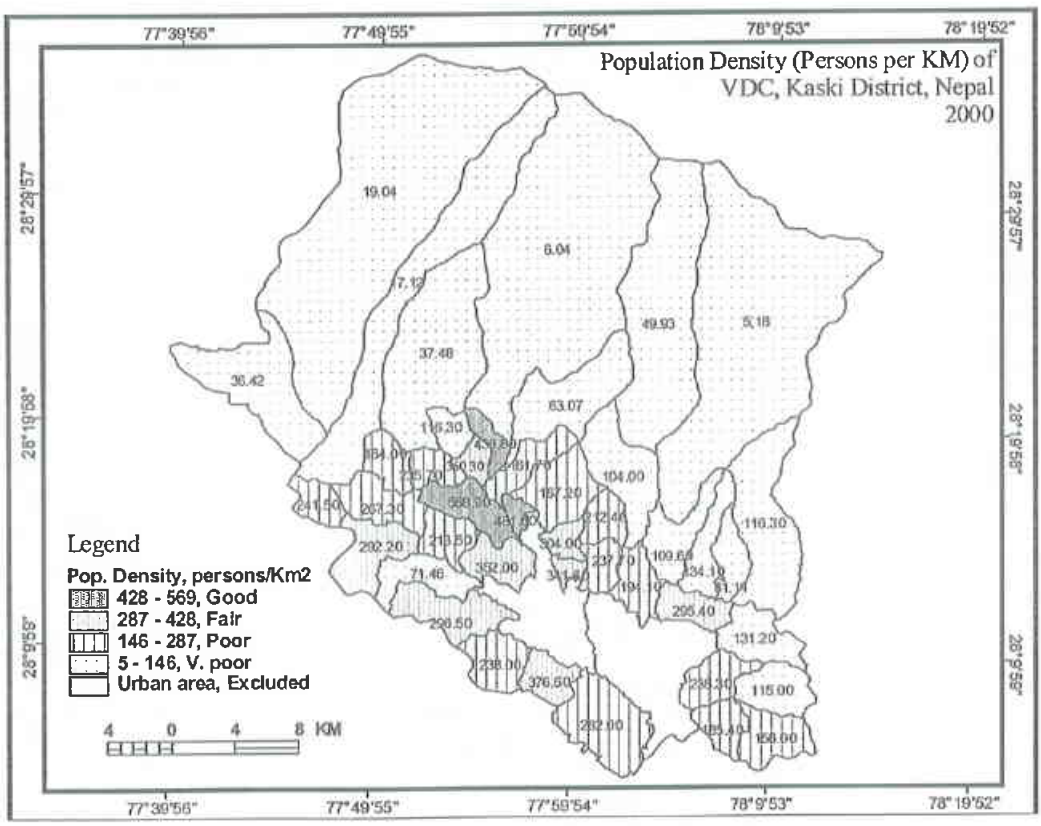


Figure 6.32 Rural Population Density, Persons per Km^2

Chapter 7
Summary of Findings, Conclusion and Recommendations

This chapter describes the summary of findings and conclusion. Based on these findings and conclusions, an attempt has been made to devise few recommendations for the application of this research methodology, application of mapping technique and other measures to improve the data and information system at the VDC and the DDC levels.

7.1 Summary of Findings

7.1.1 Adequacy of Data and Existing Gaps

According to the decentralization act 1982, the DDC is the overall planning body of the district and responsible to collect, store and manage aggregated data of the district required for planning. DDC's Information Unit handles database and possesses VDC dis-aggregated data pertaining to social, physical infrastructure, production, income and health. It has prepared digital data of the district in VDC and settlement level also.

Practically, DDC is not equipped with the data required for complete planning. The important data pertaining to natural resource and management are not available in the DDC. Out of 41 indicators set for this research only half of the data were available from the DDC. Some of the important data such as child and maternal mortality, birth rate, cropping intensity, sources of employment statistics etc. were not available in the DDC. It is good to see that DDC sells the available data to users for fund raising.

The DDC database is collected using sampling over 30 percent population. The data does not match with other data. However, when these data are used in terms of percentage or ratio gives closer picture. Standardization of data in DDC differs with CBS in few of the indicators.

VDC is the lowest administrative and planning unit in the country. VDC's elected personnel know better about the situation of their VDCs, but they are not much consulted for data collection and updating. Additionally, higher authorities neither make use of village profile - a database at VDC level, in the preparation of database nor any significant assistance is provided to prepare and update the village profile.

7.1.2 Information Flow for Planning in Nepal

The Planning Commission, the Election Commission, the Central Bureau of Statistics and the Line Ministries, in addition to the DDC are collecting and managing data for various aspect of planning operationalized at different levels. The CBS collects data in every ten years for producing population census and other socioeconomic data. They collect data by employing trained manpower, but not through the VDC or the DDC mánpower. The Election Commission collects data through the CDO office and does not consult with the VDC and the DDC. However, the person collecting data for EC is the VDC secretary. Line ministries collect data through their respective line agencies in the district. Hence, data is collected in the same level and for the same place but there is practically no coordination and consultation with the VDC, the DDC and among these organizations. Geology and Mining Department, Surveying Department, are other

organizations collecting and handling specific sectoral data for planning. These data handling and managing need experts, even then, DDC has to integrate appropriate and most useful data from these organizations to improve the district database.

7.1.3 Application of the Database for District Development

Basically, planning is done in participatory way. The needs and problems collected from the wards and the VDC level are the basis for planning in the DDC and district sectoral line agencies. Database is not much used for analysis of the problems in detail. However, it is known from DDC source that recently, information unit has initiated mapping concept to explain the problem of the district in the preliminary planing stage.

Similarly, the database prepared by the CBS is not used in the DDC. The data collected by EC is used for surveying as it covers almost all population data of a household in addition to election. Other sectoral data are used by the respective sectoral offices.

VDC level planners do not use database at lower level. Many VDC chairperson and vice-chairperson are not aware of the existing database in the district.

7.1.4 Poverty Measurement

There are basically two methods used in poverty analysis. One purely in economic terms such as Poverty Incidence or Head Count Index, Poverty Gap and Squared Poverty Gap on the basis of annual per capita income or annual consumption expenditure. This type of methodology is used by monetary organizations such as World Bank and ADB. Second is in terms of indicators reflecting poverty and development level and used by development organizations and research institutions.

Rural development planning needs blending of the two, as income alone cannot reflect the poverty situation of the rural area. The availability as well as reliability of income data at the local level determines the application and utility of the desired output. Especially, the rural people are under poverty trap and are vulnerable to different kind of situations. Therefore multi criteria indicators of poverty and local development must be used for this purpose as an alternative process of overcoming the limitation of income data.

Relationship of social wellbeing index with other development sectors is found to be weak, which shows that either development factors are not matching with the requirements of the poor people or people have not taken the advantages of the development factors.

7.1.5 Method of Analysis

Foster-Greer-Thorbecke formula, which can give three poverty measures viz. Poverty Incidence, Poverty Gap and Squared poverty Gap is found to be easy. The formula is used by World Bank assisted project in Nepal to compute the same measures, but the application is highly dependent on income related data sets.

Composite index computation is done in number of ways. Various researchers, academicians and professional claim that their respective methods are appropriate, but no method is suggested to be the best. Therefore, 0 to 1 scoring transformation method, which

is found simple, is used for this research for the standardization and suitable transformation of data used for calculating total indices. The method is the most appropriate in dealing indicators of opposite nature in a very simplified manner. The professional working at the DDC level will certainly find it very useful because to its applied value. Through this research this is very clearly demonstrated and tested through multi application.

7.1.6 Characteristics of Rural Poverty

Rural poverty is of complex nature. Income and social wellbeing index as a proxy to measure poverty has weak correlation with natural resource sector, social sector, infrastructure and institution sector, women empowerment and aggregate development sector. That means the economic measure of poverty alone cannot capture the heterogeneity of well being at the community.

Low level potential of natural resource sector signifies the poor status of the VDCs. Additionally, VDCs with high percentage of rugged land have worse condition. Mechanization is not possible in the land having slope greater than 30 degree. From soil erosion aspect it is hazardous, as the velocity of water is high which has high soil eroding capacity. There is lack of fertile soil. Soil erosion measure is only the terracing. So farmers of Nepal do terracing for agriculture. Terracing needs high labor input. Therefore people in this area has to use high labor input and get less output. They are obviously poor.

Similarly, lower the density of population, lesser is the aggregate development and worse in terms of natural resource status. This means the better rural areas in terms of aggregate development are highly populated.

The VDCs, situated closer to the district centers have shown better statrus of development meaning un-poor/non-poor because of nearness and taken the advantage of rural-urban linkages for advancing development there. The far off VDCs are poorly developed reflecting indirectly the higher order of poverty situation.

Lesser the distance between the VDC center to road head the development is higher. The far off VDCs are poorly developed. Inaccessibility is well linked to explain the poor development. This means that the inaccessible VDCs are in general poor as compared to others.

Similarly, higher road density shows the better status of natural resource sector and better status women empowerment. This finding is obvious that in a difficult terrain where accessibility is limited in general, the VDCs either closer to the road or with higher road density have reflected better situation in development and alternatively lower or no incidence poverty.

7.1.7 Spatial Analysis

Spatial analysis of issues relating to poverty and rural development has been attempted and presented in a series of maps based on individual indicator and sectoral composite indices. These maps are extremely useful for comparative assessment among VDCs to decide on priority for development, to allocate development funds, to formulate rural development projects for individual VDC or a group of VDCs (Ilaka). These maps are designed to demonstrate directly and also indirectly the poverty situation of the district.

7.2 Conclusion

Kaski DDC has made significant improvement in developing database for planning. However, some of the biophysical data are to be added in the existing database. Some of the indicators related to health such as child and maternal mortality, birth rate considered important for all other aspects of rural development should disaggregated at the VDC level and incorporated in the existing database.

Improvement of coordination between different organization such as the NPC, the CBS and line ministries working in database management is imperative to bring out the consistency and reliability in the database.

DDC Information Unit is becoming capable in managing database in the district. But some improvements are still necessary to enable it to coordinate in different levels, collect data at the VDC or in the central level and to update it on a regular basis.

Data exchange mechanism is not good between the DDC and the VDC. The DDC do not provide data to its VDCs and also does not use data prepared by the VDC. Therefore, the VDCs do not realize the importance of data collection and updating. The DDC has to play a role to reduce this gap by exchanging data and information.

The analysis of annual average per capita income and social wellbeing as a proxy of poverty measurement cannot reflect the true picture of poverty and overall situation of VDC. Rural poverty analysis should incorporate socio-economic, social and biophysical aspect to exhibit the true picture poverty of rural area.

From the analysis, it is revealed that those VDCs are better, which have balanced natural resources, shorter distance from district headquarter, near from the road head, having high road density and high population density. Those VDC having less rugged area are also better off.

The weak relationship of social wellbeing index with other development sectors shows that either development factors are not matching perfectly with the requirements of the poor people or people have not taken advantages of the available development factors. It also shows that the program intervention for poverty reduction is not appropriately designed in relation to the needs of the poor rather designed by the sectoral actors.

Poverty or wellbeing heterogeneity can be mapped in ArcView, GIS and can be easily assessed. The local uneducated people can also understand the map and realize that who are poor or non-poor and backward/backward VDCs. Therefore, local people can bargain for the resources for the development of their VDC. Thus mapping technique enhances the decentralization process also.

Finally the reliable data and information are essential to find out the true picture of a spatial unit. All the organizations involved in database management should focus their attention to establish a reliable unit in getting correct data on a regular basis. That agency may be the VDC with slight improvement in the present organizational structure. It is certainly true that computer use in the data input, storing, managing and getting output will make the process simpler and faster.

7.3 Policy Recommendations

With the greater recognition that a reliable database should be established and updated timely for the better analysis and result, the following recommendations are made. Here, some of the additional points are incorporated, which were seriously advised by the VDC planners and the DDC planners.

7.3.1 Improvement of VDC Information System

Local governance act decentralized authority to the VDC level, but it has not made provision of adequate manpower to support activities at the VDC level. Consequently, only one existing government employee the VDC secretary is heavily loaded. This employee performs all the technical, accounts and administrative duty in the VDC office. It is felt to have minimum three people: one technician, one accountant and one VDC secretary. So that, the VDC secretary can be involved efficiently in the data collection and management work. Theafter, VDC can manage to collect and update database efficiently, which is needed for the NPC, the CBS, the DDC or the EC or any other district line agencies. The duplication of economic and human resources as seen in the present process of data collection can be minimized with this arrangement.

It is not feasible to establish computer and its accessories in the VDC level in Nepal. It increases financial burden to the government. The information collected and updated in the VDC should be submitted to the DDC for compilation and processing taking the advantage of the computerization services available at the DDC.

7.3.2 Improvement of DDC Information System

Investment and inputs have gone through the UNDP support to create the database and information system to streamline the activities at the district level. Findings and recommendations if followed carefully, would improve the situation of database management system in the DDC.

DDC Information unit has already established the basic level database. Further assistance in instrument support (digitizing table, computer, vehicles, visual instruments) are required to enhance the quality of the database. Arrangements for displaying data, graphics, maps (as demonstrated through this thesis research) etc. should be made at the DDC.

The DDC is trying to raise funds by selling the data to user, which is appreciable. But the fund generated is too less for undertaking such database improvement task. DDC should provide the data and information to the VDC and has to collect feedback and comments for the purpose of developing the database further.

DDC has to initiate the process to prepare and update village level database and has to incorporate the data and information in its database regularly. This encourages the VDC to collect and update data. This also enhances the awareness of the VDC personnel regarding the importance of database. This may be taken up in the light of Thai experience in developing computerized NRD-2C database at the village level.

7.3.3 Poverty Analysis

Collection of income data is extremely difficult because people do not like to expose their exact figure of asset and income to other. At the same, it is difficult to recall the income of the whole year and provide the figure to the surveyor. That is why the information pertaining to income cannot be precise. Therefore, the analysis should be done by applying other indicators, alone with the income.

The poverty assessed in this research by social wellbeing index, as a proxy of poverty measurement can be simple technique. This indictor alone may not give true picture of the rural area, so other sectoral indicators should be analyzed to confirm the poverty of a village.

7.3.4 Recommendation for Mapping

Mapping of social indicators by spatial unit is an effective technique for rural development planning. It is simple and easy to interpret. Therefore the uneducated people can understand and use it for planning. This method should be encouraged in development planning in Nepal.

7.3.5 Indicators Reflecting Poverty

Kaski district is considered relatively an advanced district and possesses data for planning. But all other districts of Nepal are not having enough data for poverty assessment. In such case, following basic indicators can be taken for VDC level preliminary assessment of poverty.

1. Rural population density: Higher the population density the better is the wellbeing of the VDC or VDCs having low population density are poorer. Because of threshold for providing development activities, the highly populated areas get more development activities and in the long run these VDCs become more developed.

2. Distance of VDC from the district center: VDCs closer from the district center are more advanced as they have taken the advantages of the rural urban linkages for advancing the development there. The far off VDCs are poorly developed.

3. Distance of VDC from the road head: VDCs far from the road head are less developed. It is obvious that the VDCs far from the road head are poorer in natural resource endowment. It is also obvious that transportation and communication are difficult and development organization can provide less effort in such place consequently these area remain poorer.

4. Road Density: The VDCs having road are better off and VDCs having more road length have better access in all corner of the VDC and are better off from all kind of facilities.

5. Percentage of land above 30-degree slope: This land is less fertile, soil erosion prone and needs terracing for cultivation. Mechanization is not possible so that agricultural and soil conservation activities are labor intensive. This means the area needs high

labor input but gives low production, which is by virtue poorer. Higher the area of this quality, poorer is the VDC.

6. Overall literacy: Area having high literacy are better. In other words, it is also possible that the area having better facilities have higher percentage of literacy. Whatever the thing be the higher the literacy, better is the development, or lower the rate of literacy, lesser is the development.

7. Percentage of thatched roof houses: The VDCs with good economic status have less number of thatched roof houses in Nepal. The reason behind it is the poor cannot afford money to purchase slate or cement or iron-sheet and uses farm products to cover the roof of the house. Well off VDCs have less number of thatched roof houses.

8. Cultivated area: In Nepal area of cultivated land is a measure of well being. Previously, the farm size and income used to be taken to measure the poverty. So larger the cultivated land area in the VDC better is the wellbeing, or lesser the area of the cultivated area the poorer is the VDC.

7.3.6 Program Design for Poverty Alleviation

Social wellbeing index has weak relationship with sectoral composite indices in Kaski district, which means there is no matching of VDCs of better social wellbeing index with the better development index. This also shows that there is no matching of VDCs with poorer social wellbeing index with development indices. This exhibits that development activities are not given to the poor people who need it. In other case the development activities are given to those who have not taken the advantages of these activities for their betterment. Therefore before providing development activities, the poverty stricken area should be identified.

7.4 Utility of the Model for DDC /Other Agencies Including NGOs

The methodology used in this piece of research is easy to identify the poverty-stricken area or the area where the performance of chosen indicators is poor. The visual communication - the final product of the model, helps to identify the poverty and development situation of an area at a glance. Therefore the planners and policy makers in the district level will find this visual communication useful for the following activities:

1. Planning for Resource Allocation: After identifying the poverty-stricken area and development-poor area, the local planners and policy makers can plan development activities as per the requirements. This will prevent the activities to go those people who are not in need and help to provide to those people who are in need. The DDC will be in a position to allocate subsidies and resources of its own and that coming from the center to the poverty stricken area. At the same time it will be in a position to advice the donor organization working or planning to work in the district, where the people are in urgent need. For example: the VDC Thumki is very poor in literacy. DDC can request NGOs whose objective is to work in literacy program, to work in this VDC first. Similarly, DDC can ask the district education office also to allocate more resources to this VDC for literacy program. The VDC planners also can bargain for the resources with DDC or other development agencies, when they know that their VDC is poorest in education sector.

2. Monitoring and Evaluation: The visual communication is an effective tool for monitoring and evaluation also. Input and investment have gone to VDCs through various level such as district line agencies, NGO and other sources. The situation of VDC in particular indicator can be assessed and compared from map and efficiency and effectiveness can be evaluated. Then the DDC can raise the question with the implementers' as well as the local leaders about the low performance.

3. Strengthening of the Decentralization Process: The local leaders and planners know the situation of their VDC on important indictors and overall poverty situation. This information helps them to bargain for development activities. In one hand, the local leaders bargain for resources and subsidies for development activities. In the other hand DDC and line agencies through monitoring and evaluation, beckon the performances of a particular VDC in utilizing the resources in the past. This two way bargaining process enhances the decentralization process.

4. Improvement of Database and Information System: When the analysis and information sharing starts, local leaders and planners realize the importance of the data and information. The VDC level planners and personnel start collecting the true data and information from VDC and send it to DDC because they realize that if they do not give true data, the analysis cannot give true picture of their VDC. This process helps to enhance the database and information system in the DDC.

7.5 Recommendation for Further Research

a) Application of this technique for poverty analysis and mapping the poorer areas of Nepal would be very effective for designing poverty reduction program. But data and information availability does not permit to do so, as it is not available equally in all districts of Nepal. It is also true that data and information establishment for this specific purpose is a long but continuous process.

As per Nepal's thrust on poverty reduction program, there is an urgent need of alternative sources of data and information for the poverty assessment. The CBS can be a good source of information in this regard. It has completed data collection recently for the year 2001, for regular census and socio-economic data for coming ten years.

Further study could be, "Poverty Analysis and Mapping for Rural Development Planning for Nepal using CBS data" to analyze poverty in a region or in the whole country. In the study, relationship between the indictors and poverty is to be established and then the data should be applied using the relationship. Mapping is to be done in the basis of this final data.

This study may follow the similar but simpler methodology to identify suitable indicators and confirm through testing for universal application in Nepal.

b) Nepal is divided into five development regions and 14 zones. For the improvement of this methodology, similar independent studies are recommended in selected district drawing at least one sample either from each region or zone depending on research funding availability. The result will help in identifying the common and important indicators for the poverty analysis and mapping and to provide guidelines to reorganize and strengthen the DDC database.

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Appendix 1
Indicators of Siela Database

Royal Government of Combodia has implemented Seila program. The Seila program is an initiative to strengthen the local governance as a key to achieve sustainable poverty alleviation in Combodia. The following indicators are used to Classify the Communes.

No. Indicators

I. Village Statistics

1. Total number of families
2. Total number of females
3. Total number of males
4. Girls 0-4 years old (under 5s)
5. Boys 0-4 years old (under 5s)
6. Girls 5-14 years old
7. Boys 5-14 years old
8. Girls attending school 5-14 years
9. Boys attending school 5-14 years
10. Male above 65 years old
11. Female above 65 years old
12. Male illiterates over 15 years old
13. Female illiterates over 15 years old
14. Number of female invalids
15. Number of male invalids
16. Number of orphans below 15 years old
17. Number of internally displaced families > 3 years
18. Number of families of returnees < 10 years
19. Number of female-headed households
20. Number of land-less families

II. Housing

21. Number of concrete house
22. Number of wooden house
23. Number of thatch house
24. Number of houses with 220-110v electricity
25. Number of temple (Wat)

III. Education

26. Total number of primary school classrooms
27. Number of primary school classrooms need to be repaired
28. Total number of secondary school classrooms
29. Number of teachers with primary school
29. Number of teachers with primary school
30. Number of teachers with secondary school
31. Number of literacy classes

32. Number of kindergarten classrooms

IV. Health

33. Number of health worker
34. Number of Kru Khmer
35. Number of traditional birth attendants
36. Number of official trained midwives
37. Number of children mortality 0-5 years old during last 12 months
38. Number of mother mortality during delivery of baby during last 12 months

V. Water and Sanitation

39. Number of year round functioning ring wells
40. Number of year round functioning hand dug wells
41. Number of year round functioning pump wells
42. Number of potable pond water resources
43. Number of functioning latrines/toilets

VI. Transportation

44. Number of motorcycles
45. Number of tractors/cars
46. Number of horse carts and ox carts
47. Number of bicycles
48. Number of rowed boats
49. Number of motored boats
50. Distance in (km) to nearest market
51. Distance in (km) to nearest year round road (4 wheel motor vehicles)
52. Total length of rural road

VII. Agricultural Resources

53. Area in (ha) irrigated rice land
54. Area in (ha) non-irrigated rice land
55. Area in (ha) Chamka rice land
56. Area in (ha) other farm land
57. Area in (ha) mined land
58. Total length of functioning irrigation canal in (km)
59. Total length of non functioning canals in (km)
60. Number of year round irrigation water sources
61. Number of irrigation well
62. Number of functioning water gates

VIII. Crop Production

63. Number of non-functioning water gates
64. Total rice yield in last 12 months
65. Current farm gate riels/kg for rice

IX. Livestock

66. Number of non-draught cattle/buffalo
67. Number of draught cattle/buffalo
68. Number of pigs
69. Number of active village vets

X. Local Enterprise and Employment

70. Number of small enterprises
71. Number of food shops

XI. Household Assets

72. Number of T.Vs
73. Number of radios

XII. Seasonal Labor Migration

74. Number of females migrating outside village
75. Number of males migrating outside village

XIII. Community Based Organization

76. Number of cash credit groups
77. Number of animal banks
78. Number of rice banks
79. Number of portable water user groups
80. Number of irrigation water user groups

Appendix 2
Focal Site Selection Criteria, Lao PDR

Lao PDR has adopted focal site approach to achieve development. Under this program, poorest rural areas, which needs urgent attention are identified using under-mentioned criteria and programs are implemented. The program was started in 1994.

Isolation/Poverty

1. Isolated area far from town, which has not received any aid from any international organization.
2. Area flooded during the rainy season; lacks drinking water, diarrhea malaria and skin disease occur during the dry season.
3. Living condition mostly connected directly with nature; they have no market at all
4. Difficult communication. Village not connected by roads. Roads usable only in the dry season.
5. Poor people living in isolated mountainous areas.
6. Areas where the majority are ethnic people with primitive living conditions.
7. Areas with less opportunity for development, poorer than other areas.
8. Very isolated ethnic areas.
9. Areas bordering neighboring countries.
10. Under-developed areas where the people desire development.
11. Close to the border of Thailand or other Lao provinces.
12. Located very far away and isolated without roads, electricity, water supply, school, health center.
13. Living conditions are not developed, people still poor and not very healthy due to lack of health services.

Development Potentials

14. Close to national border and suitable for tourism and services.
15. Opportunity to produce commercial products from agriculture and forestry.
16. Able to construct roads, expand the commercial market, construct irrigation systems and micro-hydropower. Able to greatly expand agricultural land which is very suitable for crops and livestock and sustainable systems.
17. Rich in natural resources. Able to provide land for cultivating paddy rice and other crops. Farmers are poor and not very healthy.
18. Able to produce commercial agriculture and forestry products.
19. Suitable for development of agriculture and forestry, handicrafts, services, communication and tourism. Weak social administration. Watershed area with adequate water supplies and ability to shift from slash-burn cultivation to sedentary agriculture.

Promotion of Settled Agriculture to Replace Slash and Burn/Consolidate Scattered Small Villages

20. Able to expand and clear for cultivation. Suitable for building irrigation systems for integrated farming systems. Able to provide facilities to the new settlement. Able to stop slash and burn shifting cultivation.

21. The majority of the people practice slash and burn shifting cultivation. Many natural resources with good possibilities for development.
22. Can allocate land to the farmers who now practice slash and burn shifting cultivation so they can practice settled agriculture. Have opportunities to produce to commercial products.
23. Area with much destruction of the environment and natural resources.
24. Ethnic areas where people are able to change from slash and burn shifting cultivation in upland areas to settled agriculture in lowland areas.
25. Ethnic areas where people are living in very primitive conditions and dependent on nature. Each year they destroy large areas of forestland. Areas where there is a very urgent need for village consolidation in order to protect the environment and conserve the forests.
26. Areas where it is possible to minimize slash and burn shifting cultivation and the annual loss of natural resources. Areas where it is possible to provide more facilities for the consolidation of small scattered villages.

Participation

27. Areas which were former revolutionary bases.
28. Areas where people are active participants in development but who still have more difficulties to overcome.

Security

29. Isolated areas that have many difficulties, Areas with a need to ensure security along borders and which have problems with workers illegally travelling to bordering.
30. Areas that have more socio-economic and other difficulties and where there is a need to ensure security.
31. Areas where is a need to ensure security and where there is still no safety.
32. Areas situated along what will be main national roads in the future, but there is currently a lack of safety.

Appendix 3
NRD-2C and BMN Indicators of the Year 2000

Royal Government of Thailand started National Rural Development program in 1982. Under the program, two databases are being used: NRD-2C and BMN to identify the areas, which are in need of special attention in order to combat rural poverty. NRD-2C aims to guide the planners at different level and BMN aims to get the population involved in examining their own living condition.

NRD-2C Database Indicators

Group I: Basic Infrastructure

1. Land certificate
2. Electricity supply
3. Transportation
4. Land ownership

Group II: Production, Income and Employment

5. Entrepreneurs
6. Occupation and Employment
7. Wage rate
8. Paddy productivity
9. Upland crop productivity
10. Other occupation
11. Migration for job
12. Farmer cohesion
13. Agricultural activities in dry season

Section III: Public Health

14. Medicinal consuming security
15. Contagious disease control
16. Mental health
17. Solid waste problems
18. Sanitation at work
19. Participation in health and hygienic activities

Group IV. Water resources

20. Clean drinking water
21. Water for domestic use
22. Water for agricultural purpose

Group V: Knowledge, Education and culture

23. Education level
24. Rate of study continuation

25. State educating
26. Education center
27. Information service center
28. Religious, cultural and sport activities

Group VI: Natural Resources and Environment

29. Forest
30. Soil resources
31. Surface water resources

Basic Minimum Needs Database Indicator

Section I. Hygienic and sufficient food:

1. Pregnant women receive pre-maternal care, including a complete set of vaccination.
2. Pregnant women receive birth-giving service and post- maternal cares from qualify personal.
3. Pregnant women have adequate and proper food for consumption which resulted in newborns birth weight to be not less than 2500 grams.
4. Newborns receive mother's milk
5. Children under 1 year old receive all vaccination
6. Children 0-5 years old receive all necessary nutrition to meet their physical needs.
7. Children 6-15 years old receive all necessary nutrition to meet their physical needs.
8. Children 6-12 years old receive all vaccination
9. Non household members consume raw meet.
10. Household members consume iodine.
11. Household members consume food that has food and medical registration.
12. Household members know how to use medicine.

Section II. Residence with appropriate surrounding

13. Houses are durable, will last not less than 5 years.
14. Household members have and use hygienic latrine.
15. Household members have adequate clean drinking water throughout the year (5 liters/person/day).
16. Houses are kept clean and orderly.
17. Household members are not bothered by unpleasant factor.

Section III. Knowledge and education

18. Children 2-5 years old receive proper care
19. Scholl age children receive compulsory education level.
20. Children completed compulsory education continue in lower secondary or equivalent.
21. Children receive occupation training program.
22. Household members age 14-50 are literate.
23. Household members receive useful news or information at least three times a week.
24. Household members have knowledge about AIDS.

Section IV. Life and Asset Security:

25. Couples whose wife age 15-44 use birth control service.
26. Household members are warmly within their families.
27. Household members are safe from accidents.
28. Household members have security in their and possessions.

Section V. Household income.

29. household members work and earn on the average or not less than 20,000 baht per person per year: Average income per person per year in village.

Section VI. People participating in developing living condition and community

30. Household members are members at least one group established in the village or the sub-district.
31. People participate sincerity in democratic election.
32. Household members participate in maintaining public properties and other development activities.

Section VII. Spiritual and moral development:

33. Household members practice religious rites.
34. Household members are not addicted to alcohol.
35. Household members are not addicted to cigarette.
36. Household members participate in local cultural activities.
37. Older and handicapped receive caring from household members or people in the community.

Section VIII. Environmental conservation

38. Household members participate in conservation activities and natural resources development.
39. Household members participate in environmental protection activities.

Appendix 4
Poverty indicators used in Vietnam

Variables	Available in VLSS	Agri. Census
1. Value of consumption expenditure per capita (Dong/year/person)	X	
2. Number of persons in the household	X	X
3. Percentage of household members that are adults	X	X
4. 1 if head of household is Tay, 0 otherwise	X	
5. 1 if head of household is Thai, 0 otherwise	X	
6. 1 if head of household is Khmer, 0 otherwise	X	
7. 1 if head of household is Nung, 0 otherwise	X	
8. 1 if head of household is other minority, 0 otherwise	X	
9. 1 if head of household is minority, 0 if Kinh	X	X
10. Years of education of male adult	X	
11. Years of education of female adult	X	X
12. 1 if household is female, 0 if male	X	X
13. 1 if main occupation is farming, 0 otherwise	X	X
14. 1 if main occupation is fishing, 0 otherwise	X	X
15. Annual and perennial crop land per person (sq.m)	X	X
16. Percentage of farmland allocated to perennial crops	X	X
17. Percentage of annual cropland that is irrigated	X	X
18. Food production per capita (kg of paddy eq. Per year)	X	X
19. Number of cattle per household	X	X
20. Number of chicken per household	X	X
21. Number of pigs per household	X	X
22. Area of house (square meter)	X	X
23. 1 if house is of permanent materials, 0 otherwise	X	X
24. 1 if house is of semi-permanent materials, 0 otherwise	X	X
25. 1 if household use water from tap. 0 otherwise	X	X
26. 1 if household uses water from well, 0 otherwise	X	X
27. 1 if household has electricity, 0 otherwise	X	X
28. 1 if household owns a radio, 0 otherwise	X	X
29. 1 if household owns a television, 0 otherwise	X	X
30. 1 if household owns motorbike, 0 otherwise	X	X
31. 1 if household is in the Northern Uplands region, 0 otherwise	X	X
32. 1 if household is in the Red River Delta region, 0 otherwise	X	X
33. 1 if household is in the N. Central Coast, 0 otherwise	X	X
34. 1 if household is in the S. Central Coast, 0 otherwise	X	X
35. 1 if household is in the Central highlands, 0 otherwise	X	X
36. 1 if household is in the Southeast, 0 otherwise	X	X
37. 1 if household is in the Mekong River Delta, 0 otherwise	X	X

Appendix 5
ICIMOD
Districts of Nepal: Indicators of Development

ICIMOD took 39 indicators of development and categorized 75 districts of Nepal in 1997. The objective of the categorization of districts is to identify the districts needing foremost attention to design and implement poverty alleviation program. The indicators chosen by ICMOD are given hereunder.

1. Poverty and Deprivation

Child deprivation

1. Child 10-14 illiteracy rate
2. Child 10-14 labor rate
3. Child 10-14 Marriage rate

Gender discrimination

4. Adult gender imbalance ratio in literacy status
5. Adult gender imbalance ratio in Non agriculture occupation (above 15 years)

Disadvantage group

6. Percentage of educationally disadvantaged population. (Lower cast population)
7. Percentage of land-less and Marginal farm-household (less than 0.5 ha land)

Food production

8. Per capita food production

2. Socioeconomic and Infrastructure Development

Social and health related

9 Overall literacy rate
10 Infant mortality rate
11 Contraceptive prevalence rate
12 Drinking water coverage
13 Ratio of labor force engaged in non-agriculture to those engaged in agriculture
14 Percentage of farm households reported to have institutional agriculture credit
15 Farm size
16 Livestock per farm household
17 Cropping intensity
18 Percentage of irrigated area

Infrastructure

19 Road density

20 Banks
21 Cooperatives
22 Health institutions
23 Per capita regular Budget Allocation
24 Per capita development budget allocation
25 Post offices
26 Percentage of forestry user house holds

3. Women's Empowerment

27 Percentage share of females in Literacy (10 + years)
28 Percentage share of females in non agricultural occupation
29 Percentage share of elected females at district level
30 Percentage share of females at primary level (female teacher in P. school)
31 Percentage of share of girls enrollment in primary
32 Percentage of girl droplet at primary level (1-5)

4. Natural Resources Endowment and Management

33 Percentage of areas with slopes above 30 degree
34 Per capita forest area
35 Percentage of sloping terrace area (4033 degree)
36 Percentage of grass land area
37 Percentage of cultivated area
38 Ratio of non-cultivated area to cultivated area
39 Gross rural population density

Appendix 6
Coordination Schema

This chapter presents the linkages between each objective under research and its lowest order measurement, value in stepwise specification and definition process. It helps to avoid duplication, overlapping and unintentional gap in the research process. Table 7.1 presents steps that have been followed to streamline the research in the research. Objects are broken down to aspect or problem area, and then complex variables, the anticipated sources of data and method of data analysis in the succeeding column.

Table 6.1 Breakdown of Objectives to Aspect, Complex Variable, Sources of Data and Method of Analysis

S no	Objective	Aspect	Complex variables	Source of data	Method of Analysis
1	To review sources of data and information, types of data and level of availability at district level;	• database • Planning • Coordination • Support	• Indicators • Programming • Organigram • Sources of data • Analysis of data • District Planning System • Use of data in planning in DDC • Use of data in planning in VDC • Coordination of DDC with other line agencies in data sharing. • Central level organization for data management. • Vertical and horizontal flow of information. • Dissemination of data from DDC • Database management support - data collection - management - analysis - dissemination	• Literature • Computer specialist, • Literature, observation • Literature and observation • Literature and planners • Literature and DDC members and Planners • DDC and VDC members and literature • DDC member and Planners • Central level and district level planners • DDC members and Planners, Literature • District planners and VDC planners • Literature and Planners	Qualitative method . . . Same for All . .
2	To gain views and feedback from local planners about the adequacy and quality of the database and identify the problems, needs and constraints;	• Strength • Weakness • Threat • Improvement needed	• All above points		

3	To establish a spatial database by VDC from the existing database and identify gaps to implement the database for local development planning;	• Demographic • Geographic • Natural resources and environment • Production, Income and Employment • Public health • Water resources • Knowledge, Education, and culture • Infrastructure • Institution		DDC and line agencies and central level organizations	
4	To apply the data and information for poverty mapping at the Village Development Committee level using Geographic Information System; and	• Economic • Deprivation • Human well being • Natural resources and Environment • Basic Infrastructure • Institution • Women empowerment	• DDC, Respective line agencies and central offices	See table 2	
5	To recommend for support services for strengthening database and information system at the DDC level.	• Data • Organization • flow information	• Indicators addition • Collection of data • Standardization • Analysis • Use in planning • Structure • Vertical • Horizontal		

In Table 2, objectives are broken down to complex variables and simple variables. Values of the simple variables are written and the anticipated data sources and methods of data analysis are written. The Coordination schema was prepared before going to the field.

Table 6.2 Objective Broken Down to Complex Variables, Simple Variables, and Given Value, Source of Data and Method of Analysis.

S no.	Objective	Complex Variables	Variables	Value	Data Available in Unit	Source	Methods of Analysis
1		Economic	1. Income	Av. Rupees	HH	DDC/NPC	• GIS Mapping
			2. Employment	%	HH	DDC/NPC	• Pattern anal.
			3. Entrepreneur-ship	%	HH	DDC/NPC	• Interrelationship
2		Deprivation	4. Child illiteracy percentage	%	VDC	DDC/DEO	• GIS Mapping
			5. Child labor percentage	%			• Pattern anal.
			6. Percentage of Lower cast population	%	VDC	DDC/DEO	• Interrelationship
			7. Percentage of land-less and Marginal farm-household	%	VDC	DDC	
			8. Per capita food production	Calorie	VDC	DDC/DAO	
			9. Wage rate	Rupees	VDC	DDC/VDC	
3		Human well being	10. Overall literacy rate	%	VDC	DDC	• GIS Mapping
			11. Infant mortality rate	%	VDC	DDC/DWSO	• Pattern anal.
			12. Drinking water coverage	%	VDC	DDC	• Interrelationship
			13. Ratio of labor force engaged in non-agriculture to those engaged in agriculture	Ratio	VDC	DDC/DAO	
			14. Farm size	Ha.	HH	DDC/DAO	
			15. Livestock per farm household	No/HH	HH	DDC/DAO	
			16. Cropping intensity	Ratio	VDC	DDC/DAO	
			17. Percentage of irrigated area	%	VDC	DDC/DIO	
			18. Percentage of household without electricity	%	VDC	DDC/DEA	
		Infrastructure	19. Road access	Hrs.	VDC	DDC/VDC	
			20. Road density	Km/100Km^2	VDC	DDC/DRO	
4		Institution	21. Banks	Number	VDC	DDC	
			22. Cooperatives	Number	VDC	DDC	
			23. Health institutions	Number	VDC	DDC	
			24. Post offices	Number	VDC	DDC	
			25. Secondary school	Number	VDC	DDC	

5		Women's empowerment	26. Adult gender imbalance ratio in literacy status 27. Percentage share of females in non agricultural occupation 28. Percentage of girls in primary education 29. Percentage of girl dropout at primary level (1-5 class) 30. Maternal mortality rate	Ratio % % 5 Per 1000 births	VDC VDC VDC VDC VDC	DDC/DEO DDC/DEO DDC/DEO DDC/DEO DDC/DHO	• GIS Mapping • Pattern anal. • Interrelationship
6		Natural resource endowment and management	31. Percentage of areas with slopes above 30 degree 32. Per capita forest area 33. Percentage of grass land area 34. Percentage of cultivated area 35. Ratio of non-cultivated area to cultivated area 36. Area under deforestation 37. Area under soil erosion effect 38. Gross rural population density	% Ha/HH % % Ratio Ha Ha Number/Km^2	VDC VDV VDC VDC VDC VDC VDC VDC	DDC/LRMP DDC/LRMP DDC/DFO DDC DDC/LRMP DDC/LRMP DDC/DSCO DDC	• GIS Mapping • Pattern anal. • Interrelationship

Source: Modified from the Works of ICIMOD, Routray, Dixon etc.

DAO	District Agriculture Office
DDC	District Development Committee
DEO	District Education Office
DIO	District irrigation Office
DWSSO	District water supply Office
HH	Household
LRMP	Land Resources' Mapping Project
NPC	National Planning Commission
VDC	Village Development Committee
DSCO	District Soil Conservation Office
DOF	Department of Forestry
DNEA	District Nepal Electricity Authority

Appendix 7
Check List for Interview

This set of checklist contains the typical questions that have been used in the field for information collection. Same sets of checklists with few minor modifications were used to get information from central level planners, district level planners, DDC members and VDC members.

Name:
Organization:
Position:
Address:
Years of Work:

1. Database situation at present in DDC
- Comments on database indicators
- Opinion on administrative structure for database management in the DDC
- Opinion on administrative structure in vertical flow of information
- Opinion on administrative structure in horizontal flow of information- line agencies and NGOs
- Facilities available for database management in the district
- Effectiveness of the layers VDC to Central offices

2. Sufficiency of indicators for planning
- The indicators are sufficient
- What are other indicators needed? Why

3. Data collection
- Data collection methods for different types of data
- Financial Resources
- Human resources
- Problems in data collection
- Elected personnel's role in data collection
- Weakness in data collection
- Improvement needed

4. Assistance in database management system
- Donor organizations
- DDC's own initiation
- Line agencies' assistance

5. Data management
- Program used
- The program used is cost effective and user friendly?
- Other program if you know and how
- Trained manpower
- Staff facilities: monetary, training, work load

6. Data Sharing
- Weaknesses in data sharing
- Problems of data sharing from the district level

7. Data use in planning
- Data used in planning
- Opinion on effective method of use of data in planning

8. Who likes to use data most/
- Your opinion in using or not using the data in planning
- Data redundancy reason

9. Improvement in database
- How the database can be made effective
- What facilities are essential for the database management?
- If donor assistance is withdrawn what happens?
- The program being used in this district is replicable in other district

10. Future program

11. Poverty mapping
    Indicators needed

Appendix 8
Checklist for Secondary Data

Table 8.1 General Demographic Indicators

S.NO	village	Ilaka No.	Area, Sq.km	HH	Population Male	Female	Total
1	Arbabijaya						
2	Armala						
3	Bhachok						
4	Bhadauretamagi						
5	Bhalam						
6	Bharatpokhari						
7	Chapakot						
8	Dangsing						
9	Deurali						
10	Dhampus						
11	Dhikurpokhari						
12	Dhital						
13	Ghachok						
14	Ghandruk						
15	Hansapur						
16	Hemja						
17	Kahu						
18	kalika						
19	Kaskikot						
20	Kristinachnechaur						
21	Lahachok						
22	Lamachaur						
23	Lumle						
24	Lwangghalel						
25	Machhapuchre						
26	Majhthatna						
27	Mauja						
28	Mijuredanda						
29	Namajung						
30	Nirmalpokhari						
31	Parche						
32	Pumdi Bhumdi						
33	Puranchaur						
34	Rivan						
35	Rupakot						
36	Saimarang						
37	Salyan						
38	Sarangkot						
39	Sardikhola						
40	Siddha						
41	Sildujure						
42	Thumakotdanda						
43	Thumki						

Source: DDC Profile, Kasksi and Conceptual Framework

Check list for Secondary Data

Table 8.2 Indicators of Economic Sector

S.no	village	Av per capita income	Employment	Wage rate	Consumption level
1	Arbabijaya				
2	Armala				
3	Bhachok				
4	Bhadauretamagi				
5	Bhalam				
6	Bharatpokhari				
7	Chapakot				
8	Dangsing				
9	Deurali				
10	Dhampus				
11	Dhikurpokhari				
12	Dhital				
13	Ghachok				
14	Ghandruk				
15	Hansapur				
16	Hemja				
17	Kahu				
18	kalika				
19	Kaskikot				
20	Kristinachnechaur				
21	Lahachok				
22	Lamachaur				
23	Lumle				
24	Lwangghalel				
25	Machhapuchre				
26	Majhthatna				
27	Mauja				
28	Mijuredanda				
29	Namajung				
30	Nirmalpokhari				
31	Parche				
32	Pumdi Bhumdi				
33	Puranchaur				
34	Rivan				
35	Rupakot				
36	Saimarang				
37	Salyan				
38	Sarangkot				
39	Sardikhola				
40	Siddha				
41	Sildujure				
42	Thumakotdanda				
43	Thumki				

Source: DDC Profile, Kasksi and Conceptual Framework

Checklist for Secondary

Table 8.3 Indicators of Deprivation

S.no	village	Child Illiteracy rate	Child labor rate	Adult gender imbalance ratio	Food availability for # months	% of LC ST	% of Land less and marginal land holder
1	Arbabijaya						
2	Armala						
3	Bhachok						
4	Bhadauretamagi						
5	Bhalam						
6	Bharatpokhari						
7	Chapakot						
8	Dangsing						
9	Deurali						
10	Dhampus						
11	Dhikurpokhari						
12	Dhital						
13	Ghachok						
14	Ghandruk						
15	Hansapur						
16	Hemja						
17	Kahu						
18	kalika						
19	Kaskikot						
20	Kristinachnechaur						
21	Lahachok						
22	Lamachaur						
23	Lumle						
24	Lwangghalel						
25	Machhapuchre						
26	Majhthatna						
27	Mauja						
28	Mijuredanda						
29	Namajung						
30	Nirmalpokhari						
31	Parche						
32	Pumdi Bhumdi						
33	Puranchaur						
34	Rivan						
35	Rupakot						
36	Saimarang						
37	Salyan						
38	Sarangkot						
39	Sardikhola						
40	Siddha						
41	Sildujure						
42	Thumakotdanda						
43	Thumki						

Source: DDC Profile, Kasksi and Conceptual Framework

Checklist for Secondary Data

Table 8.4 Indicators for Social Sector

S.no	village	Overall literacy rate	Birth rate	infant mortality rate	Drinking water Coverage (%)	Farm size (opert area /hh)	Croppi-ng Intensi-ty	% of irrigate -d area	Ratio of labor force engaged in non-agri. To those engaged in agri	Live stock pop per farm	% o hous wit thatc roo
1	Arbabijaya										
2	Armala										
3	Bhachok										
4	Bhadaure										
5	Bhalam										
6	Bharatpok										
7	Chapakot										
8	Dangsing										
9	Deurali										
10	Dhampus										
11	Dhikurpok										
12	Dhital										
13	Ghachok										
14	Ghandruk										
15	Hansapur										
16	Hemja										
17	Kahu										
18	kalika										
19	Kaskikot										
20	Kristinach										
21	Lahachok										
22	Lamachaur										
23	Lumle										
24	Lwangghal										
25	Machhapu										
26	Majhthatna										
27	Mauja										
28	Mijuredan										
29	Namajung										
30	Nirmalpok										
31	Parche										
32	Pumdi										
33	Puranchaur										
34	Rivan										
35	Rupakot										
36	Saimarang										
37	Salyan										
38	Sarangkot										
39	Sardikhola										
40	Siddha										
41	Sildujure										
42	Thumakotd										
43	Thumki										

Source: DDC Profile, Kasksi and Conceptual Framework

Check List for secondary Data

Table 8.5 Indicators for Infrastructure and Institution Sector

S.no	village	No of banks	No of Cooperatives	No of Agri-centers	Post office	No of Health posts	Sec. School	Road access	Road density per 100 sq.km
1	Arbabijaya								
2	Armala								
3	Bhachok								
4	Bhadauretamagi								
5	Bhalam								
6	Bharatpokhari								
7	Chapakot								
8	Dangsing								
9	Deurali								
10	Dhampus								
11	Dhikurpokhari								
12	Dhital								
13	Ghachok								
14	Ghandruk								
15	Hansapur								
16	Hemja								
17	Kahu								
18	kalika								
19	Kaskikot								
20	Kristinachnechaur								
21	Lahachok								
22	Lamachaur								
23	Lumle								
24	Lwangghalel								
25	Machhapuchre								
26	Majhthatna								
27	Mauja								
28	Mijuredanda								
29	Namajung								
30	Nirmalpokhari								
31	Parche								
32	Pumdi Bhumdi								
33	Puranchaur								
34	Rivan								
35	Rupakot								
36	Saimarang								
37	Salyan								
38	Sarangkot								
39	Sardikhola								
40	Siddha								
41	Sildujure								
42	Thumakotdanda								
43	Thumki								

Source: DDC Profile, Kasksi and Conceptual Framework

Checklist for Secondary Data

Table 8.6 Indicators of Women Empowerment Sector

S.no	village	% of female Illiteracy	% of female in non-agri occup.	% of girls in prim education	% of girls dropout in primary level	Maternal mortality
1	Arbabijaya					
2	Armala					
3	Bhachok					
4	Bhadauretamagi					
5	Bhalam					
6	Bharatpokhari					
7	Chapakot					
8	Dangsing					
9	Deurali					
10	Dhampus					
11	Dhikurpokhari					
12	Dhital					
13	Ghachok					
14	Ghandruk					
15	Hansapur					
16	Hemja					
17	Kahu					
18	kalika					
19	Kaskikot					
20	Kristinachnechaur					
21	Lahachok					
22	Lamachaur					
23	Lumle					
24	Lwangghalel					
25	Machhapuchre					
26	Majhthatna					
27	Mauja					
28	Mijuredanda					
29	Namajung					
30	Nirmalpokhari					
31	Parche					
32	Pumdi Bhumdi					
33	Puranchaur					
34	Rivan					
35	Rupakot					
36	Saimarang					
37	Salyan					
38	Sarangkot					
39	Sardikhola					
40	Siddha					
41	Sildujure					
42	Thumakotdanda					
43	Thumki					

Source: DDC Profile, Kasksi and Conceptual Framework

Check List for Secondary Data

Table 8.7 Indicators for Natural Resources and Management Sector

S.NO	village	% of area with slope above 30 deg	% of Grass land area	% of Cultiv. area	% of forest area	% of area affected by soil erosion	area under deforest-ation	Gross pop density
1	Arbabijaya							
2	Armala							
3	Bhachok							
4	Bhadauretamagi							
5	Bhalam							
6	Bharatpokhari							
7	Chapakot							
8	Dangsing							
9	Deurali							
10	Dhampus							
11	Dhikurpokhari							
12	Dhital							
13	Ghachok							
14	Ghandruk							
15	Hansapur							
16	Hemja							
17	Kahu							
18	kalika							
19	Kaskikot							
20	Kristinachnechaur							
21	Lahachok							
22	Lamachaur							
23	Lumle							
24	Lwangghalel							
25	Machhapuchre							
26	Majhthatna							
27	Mauja							
28	Mijuredanda							
29	Namajung							
30	Nirmalpokhari							
31	Parche							
32	Pumdi Bhumdi							
33	Puranchaur							
34	Rivan							
35	Rupakot							
36	Saimarang							
37	Salyan							
38	Sarangkot							
39	Sardikhola							
40	Siddha							
41	Sildujure							
42	Thumakotdanda							
43	Thumki							

Source: DDC Profile, Kasksi and Conceptual Framework

Appendix 9
Secondary Data Collected from the Field

Table 9.1 VDC, Respective Ilaka No., Area and Population Data

S. no	village	Ilaka No	Area, Sq. Km	HH	Population			Pop.lead by		Population by age						
					Male	Fem	Total	Male	Fem	0-5		6-14		15-60		
										M	F	M	F	M	F	M
1	Arbabijaya	7	14.6	590	1847	1623	3470	513	77	237	230	453	333	1024	953	13
2	Armala	13	36.01	1097	3053	2967	6020	1020	77	257	223	637	753	1947	1820	21
3	Bhachok	3	27.89	407	1123	1140	2263	363	43	90	80	330	327	620	650	8
4	Bhadaureta	9	15.07	657	2247	2157	4404	613	43	177	200	523	463	1327	1297	22
5	Bhalam	8	9.89	500	1600	1407	3007	423	77	87	110	293	270	1033	920	18
6	Bharatpok	2	36.63	1683	5037	4560	9597	1490	193	447	427	134	112	2833	2670	41
7	Chapakot	9	48.74	593	1840	1643	3483	543	50	187	163	497	413	1013	960	14
8	Dangsing	10	66.37	437	1290	1127	2417	380	57	70	100	343	263	727	691	15
9	Deurali	1	18.61	637	1753	1697	3450	520	117	133	123	380	363	1100	1037	14
10	Dhampus	11	18.03	497	1547	1410	2957	390	107	113	123	367	273	927	877	14
11	Dhikurpok	11	23.17	1110	3223	2970	6193	903	207	300	240	817	703	1883	1830	22
12	Dhital	11	17.66	720	2100	2063	4163	623	97	243	273	507	480	1207	1150	14
13	Ghachok	12	6.14	487	1383	1310	2693	433	53	107	100	403	357	760	773	11
14	Ghandruk	10	296.51	953	2997	2650	5647	857	97	387	320	687	527	1600	1600	32
15	Hansapur	3	17.97	573	1260	1097	2357	477	97	217	230	177	83	833	761	3
16	Hemja	12	13.22	1267	3831	3690	7521	1180	87	347	370	903	897	2364	2176	21
17	Kahu	8	6.51	400	1107	1117	2224	327	73	80	90	274	267	670	687	8
18	kalika	4	23.03	733	2313	2157	4470	570	163	193	193	477	504	1410	1260	23
19	Kaskikot	9	26.43	950	2960	2683	5643	797	153	257	260	603	560	1873	1667	22
20	Kristinach	6	25.91	1017	3320	2847	6167	857	160	303	277	757	623	1977	1747	28
21	Lahachok	12	11.38	670	2080	2020	4100	570	100	210	203	467	450	1220	1190	18
22	Lamachaur	8	6.63	537	1640	1553	3193	447	90	137	113	380	213	1033	1097	9
23	Lumle	10	60.97	247	567	477	1044	230	17	60	40	157	110	293	283	5
24	Lwangghal	11	151.38	963	3000	2673	5673	817	147	347	340	787	737	1627	1403	24
25	Machhapu	13	272.84	280	840	807	1647	210	70	53	43	170	137	530	517	8
26	Majhthatna	4	13.79	727	2063	2010	4073	590	137	263	223	427	447	1210	1180	16
27	Mauja	8	11.83	377	1400	1113	2513	320	57	127	107	300	200	853	703	12
28	Mijuredan	3	29.63	793	1647	1800	3447	633	160	123	107	410	247	1100	1370	1
29	Namarjung	5	273.33	263	717	693	1410	237	27	73	43	110	113	420	457	11
30	Nirmalpok	6	13.09	880	2627	2303	4930	753	127	270	197	593	470	1570	1440	19
31	Parche	5	72.9	630	1993	1647	3640	543	87	223	193	503	390	1060	903	20
32	Pumdi	6	23.12	1177	3557	3297	6854	957	220	417	363	847	833	1993	1793	30
33	Puranchaur	13	25.58	760	2080	2057	4137	683	77	247	190	597	607	1117	1073	12
34	Rivan	12	12.9	337	763	737	1500	253	83	30	30	173	160	450	430	11
35	Rupakot	1	16.79	727	2150	1817	3967	657	70	197	190	523	400	1290	1083	14
36	Saimarang	3	15.46	377	1040	1033	2073	327	50	167	123	213	280	557	543	10
37	Salyan	10	16.26	600	1977	1950	3927	493	107	283	227	453	543	1090	1057	15
38	Sarangkot	9	16.25	1050	2900	2820	5720	903	147	293	337	777	673	1653	1650	17
39	Sardikhola	13	54.07	607	1803	1607	3410	483	123	150	140	410	283	1067	1013	17
40	Siddha	1	20.81	677	1727	1520	3247	620	57	205	190	343	293	1083	960	9
41	Sildujure	5	38.58	710	2103	1910	4013	607	103	173	230	533	460	1213	1067	18
42	Thumakotd	5	41.62	817	2393	2167	4560	740	77	263	210	473	403	1397	1333	26
43	Thumki	1	24.29	563	1527	1267	2794	510	53	127	163	347	297	923	740	13

Source: DDC, Kaski,

Secondary Data Collected from the Field

Table 9.2 Different Indicators Selected for the Study and their Values for the VDCs

S.no	Village	Ilaka	HH	%	% Femal	Culti-	Food defict	Male	Female	Total
			Income, Nrs	Employm	in Non-agri	area ha	3-9 months	Illiterate	Illiterate	Illiterate
1	Arbabijaya	7	47915	1	0	242.5	71.0	430	683	1113
2	Armala	13	22782	7.5	4.04	563.9	68.8	823	1477	2300
3	Bhachok	3	38296	1	0	305.9	41.5	250	473	723
4	Bhadauretamagi	9	24903	1	0	569.1	44.6	613	927	1540
5	Bhalam	8	36379	5.5	1.6	233.9	77.6	183	440	623
6	Bharatpokhari	2	26391	5	0.6	1194.0	50.8	853	1573	2426
7	Chapakot	9	21413	7.5	1.3	353.0	74.2	540	807	1347
8	Dangsing	10	67071	2.5	5.8	184.6	42.0	513	620	1133
9	Deurali	1	30404	8	1.8	382.3	71.0	400	777	1177
10	Dhampus	11	33374	6.5	5.5	269.2	70.2	377	720	1097
11	Dhikurpokhari	11	33995	2.5	1.5	779.3	60.6	770	1190	1960
12	Dhital	11	32381	4	2.2	625.6	57.8	577	1120	1697
13	Ghachok	12	23304	1	0	232.2	66.4	326	537	863
14	Ghandruk	10	3862	1	0	556.9	84.2	1100	1300	2400
15	Hansapur	3	18742	4	0.7	440.8	37.0	1147	993	2140
16	Hemja	12	64015	2	1.2	726.3	55.0	776	1473	2249
17	Kahu	8	31605	6	2.3	207.9	70.0	123	403	526
18	kalika	4	19469	4.5	1.3	542.8	61.0	630	1007	1637
19	Kaskikot	9	8643	2	0	666.1	69.0	1213	1653	2866
20	Kristinachnechau	6	23983	9	2.6	721.2	81.4	603	997	1600
21	Lahachok	12	39709	6	1	349.2	72.0	570	960	1530
22	Lamachaur	8	15023	7.5	0.8	277.3	76.0	330	557	887
23	Lumle	10	23835	6.5	10.3	93.7	44.0	210	220	430
24	Lwangghalel	11	31375	3.5	1.1	438.9	57.2	1103	1560	2663
25	Machhapuchre	13	51773	1	0.6	246.3	52.5	230	417	647
26	Majhthatna	4	15270	3	0.9	448.4	69.2	397	763	1160
27	Mauja	8	34008	6	0.6	287.1	59.4	457	663	1120
28	Mijuredanda	3	29024	7	1.7	629.8	19.3	894	1220	2114
29	Namarjung	5	65413	8.2	2.3	185.3	48.0	420	473	893
30	Nirmalpokhari	6	21820	7	1.4	530.3	69.3	593	1013	1606
31	Parche	5	51702	1	0.3	256.9	61.0	370	1103	1473
32	Pumdi Bhumdi	6	41054	6.5	0.9	649.4	81.7	687	1471	2158
33	Puranchaur	13	29805	7	2.8	410.7	61.5	403	783	1186
34	Rivan	12	22552	1	0	237.1	54.3	220	443	663
35	Rupakot	1	10260	5	0	172.4	53.7	550	937	1487
36	Saimarang	3	18499	2	0	241.0	62.0	343	527	870
37	Salyan	10	41279	8.5	1.8	269.1	74.0	520	933	1453
38	Sarangkot	9	21774	7	3.7	403.2	69.2	773	1223	1996
39	Sardikhola	13	61381	6.5	3.5	231.7	43.3	417	817	1234
40	Siddha	1	24807	3.5	0.4	313.4	70.5	1297	1257	2554
41	Sildujure	5	6514	1	0.4	385.3	80.2	777	1170	1947
42	Thumakotdanda	5	34010	6.5	1.7	529.5	45.0	573	1010	1583
43	Thumki	1	25386	11	0	399.3	35.5	1480	1240	2720

Source: DDC, Kaski, 2000

Secondary Data Collected from the Field

Table 9.3 Different Indicators Selected for the Study and Their Values for the VDCs

S.no	Village	Livestock	Thatched	Male in	Female in	LC	Drinking	Irrigated	electri	Ro
		Nos.	roofs	1-6 class	1-6 class	Popu	Wat-coverg	area, ha	Benf-HH	Distan
1	Arbabijaya	2077	9.6	396	286	90	2556	14.5	470	
2	Armala	4066	6.4	907	870	243	5537	358	588	
3	Bhachok	1914	47.5	503	427	60	2723	108.4	0	
4	Bhadauretam	2630	26.9	564	463	157	4184	105.7	17	
5	Bhalam	1587	4.7	323	307	37	3132	144.7	346	
6	Bharatpokhari	8293	19.2	1256	1257	283	6474	630.8	1178	
7	Chapakot	2517	33.7	660	547	130	2733	162.6	657	
8	Dangsing	680	38.9	416	340	110	4253	9	0	
9	Deurali	2977	49.2	540	516	87	3400	146.9	0	
10	Dhampus	1633	34.2	483	370	180	3348	124.3	267	
11	Dhikurpokhari	4457	14.4	867	794	223	4414	432.6	669	
12	Dhital	2474	20.3	570	524	21	4523	148.2	0	
13	Ghachok	3865	20.6	370	320	120	2791	149.8	277	
14	Ghandruk	6904	21	1027	967	234	3415	668.4	60	
15	Hansapur	4183	60.5	13	16	110	3415	343.4	60	
16	Hemja	3440	2.6	1097	1080	109	7760	468.9	1132	
17	Kahu	1850	9.2	384	360	43	2307	17.2	540	
18	kalika	3787	20.9	546	543	83	3909	269.1	574	
19	Kaskikot	3193	25.3	527	376	120	5015	316.8	775	
20	Kristinachnec	4390	20.7	1057	817	103	5328	304.3	361	
21	Lahachok	2000	17.9	676	606	144	4000	299.3	103	
22	Lamachaur	1023	6.2	483	614	93	2108	183	791	
23	Lumle	170	21.6	113	97	63	4844	1.4	0	
24	Lwangghalel	6247	26.3	1140	780	190	5428	476.2	0	
25	Machhapuchre	8081	36.9	283	210	43	2226	190.5	0	
26	Majhthatna	3241	42.2	696	690	57	2048	236.6	0	
27	Mauja	1507	23.9	424	227	84	1854	163.6	80	
28	Mijuredanda	4636	52.1	360	277	160	3784	538.3	0	
29	Namarjung	2330	13.9	87	103	33	1467	131.5	0	
30	Nirmalpokhari	5923	37.5	777	670	157	2001	247.3	750	
31	Parche	5197	12.7	474	330	137	2977	233.3	213	
32	Pumdi Bhumdi	8847	14.4	1244	1103	227	7180	265.2	445	
33	Puranchaur	2733	12.3	776	700	124	4099	351.9	0	
34	Rivan	1023	13.9	204	160	57	1273	117.2	0	
35	Rupakot	4417	60.6	730	513	63	3000	63.7	61	
36	Saimarang	1763	59.3	360	310	114	2194	59	0	
37	Salyan	1963	20.6	587	584	194	2786	39.7	0	
38	Sarangkot	2811	2.9	840	807	143	6000	165.5	722	
39	Sardikhola	3294	9.3	623	496	43	3774	175	0	
40	Siddha	1610	63.1	230	187	66	1965	239.9	0	
41	Sildujure	2790	40.8	830	557	167	3811	262.3	0	
42	Thumakotdana	3376	36.7	687	553	169	4670	498.8	0	
43	Thumki	4049	74.6	.	.	63	4389	258.1	0	

Source: DDC, Kaski, 2000

Secondary Data Collected from the Field

Table 9.4 Different Indicators Selected for the Study and Their Values for the VDCs

S.no	Village	Road length, Km	Bank No	Cooper -atives	Agri- center	Road Length	% area >30D slope	Grass land %	Forest land %	Cultvtd land %	Populn Density
1	Arbabijaya	9.40	0	0	0	9.40	6.81	61.03	68.67	16.38	237.7
2	Armala	6.53	0	3	0	6.53	17.41	0	5.37	6.88	167.2
3	Bhachok	0.00	0	0	0	0.00	11.29	2.55	13.69	13.49	81.14
4	Bhadauretamagi	7.62	0	0	0	7.62	17.13	0	7.43	8.4	292.2
5	Bhalam	4.72	1	1	0	4.72	3.1	0	17.55	8.6	304
6	Bharatpokhari	7.87	0	2	0	7.87	22.98	0	3.23	5.23	262
7	Chapakot	1.75	0	0	0	1.75	13.62	2.82	21.68	19.54	71.46
8	Dangsing	0.00	0	0	0	0.00	33.44	0	10.73	11.01	36.42
9	Deurali	0.00	0	0	0	0.00	9.77	3.23	29.38	11.35	185.4
10	Dhampus	0.00	0	1	0	0.00	11.35	0	6.67	8.26	164
11	Dhikurpokhari	24.59	0	3	1	24.59	9.29	0	6.67	8.33	267.3
12	Dhital	5.63	1	0	0	5.63	11.01	0	9.01	13.69	235.7
13	Ghachok	3.50	1	1	1	3.50	5.99	0.62	1.93	9.15	438.6
14	Ghandruk	0.00	0	0	0	0.00	18.99	0.9	3.78	3.78	19.04
15	Hansapur	4.76	0	3	0	4.76	12.94	0	10.39	13.14	131.2
16	Hemja	16.23	1	3	0	16.23	10.8	1.03	10.05	10.46	568.9
17	Kahu	1.17	0	0	0	1.17	1.17	0	1.03	3.78	341.6
18	kalika	13.79	0	0	0	13.79	9.98	0.96	6.74	9.56	194.1
19	Kaskikot	9.61	0	2	0	9.61	4.34	1.38	3.1	12.32	213.5
20	Kristinachnecha	12.80	0	0	0	12.80	9.56	0.62	8.26	13.21	238
21	Lahachok	6.82	0	1	0	6.82	3.85	1.24	1.24	5.78	360.3
22	Lamachaur	4.74	0	5	0	4.74	0.9	1.1	1.03	3.17	481.6
23	Lumle	8.61	0	0	0	8.61	67.92	0	43.97	11.97	17.12
24	Lwangghalel	0.05	0	0	0	0.05	90.28	13.83	70.12	16.31	37.48
25	Machhapuchre	1.36	0	0	0	1.36	124.89	103.63	90.97	5.16	6.04
26	Majhthatna	1.71	0	0	0	1.71	8.95	0.07	6.26	10.12	295.4
27	Mauja	0.00	0	0	1	0.00	6.95	0.21	3.92	9.63	212.4
28	Mijuredanda	0.00	0	0	0	0.00	51.61	4.4	43.42	15.55	116.3
29	Namarjung	0.00	0	0	0	0.00	26.49	26.01	120.49	9.77	5.16
30	Nirmalpokhari	4.97	1	0	0	4.97	9.01	0.9	4.82	9.91	376.6
31	Parche	0.00	0	0	0	0.00	74.86	8.6	64.54	12.18	49.93
32	Pumdi Bhumdi	16.84	0	6	0	16.84	12.66	0	14.04	15.28	296.5
33	Puranchaur	3.79	0	4	0	3.79	10.53	1.74	10.94	5.37	161.7
34	Rivan	0.20	0	0	0	0.20	5.78	1.31	3.99	5.64	116.3
35	Rupakot	2.33	0	0	0	2.33	13.21	0	9.77	9.15	236.3
36	Saimarang	0.00	0	0	0	0.00	15.96	0.14	13.14	6.88	134.1
37	Salyan	5.31	0	1	0	5.31	4.47	0.55	4.95	6.61	241.5
38	Sarangkot	12.69	1	1	0	12.69	8.12	0.83	6.67	11.84	352
39	Sardikhola	2.58	0	0	0	2.58	39.7	5.57	35.71	9.5	63.07
40	Siddha	0.00	0	0	0	0.00	8.4	0	8.05	6.26	156
41	Sildujure	0.00	0	0	0	0.00	27.26	0.34	26.97	13.76	104
42	Thumakotdanda	0.13	0	1	1	0.13	16.1	0.48	12.11	13.07	109.6
43	Thumki	0.00	0	0	0	0.00	11.97	0	9.5	11.7	115

Source: DDC Kaski, 2000 and LRMP, 1978

Appendix 10
Poverty and Composite Index Computations

This section describes the process of computation of Poverty Incidence, Poverty Gap and Squared Poverty Gap using Foster-Greer-Thorbecke formula and the composite index using 0-1 scoring transformation method. The computed value of the TVs with their raw data is tabulated at the end of this section in Table 1-7.

1. Based On Annual Average Per Capita Income

Poverty Incidence, Poverty Gap and Squared Poverty Gap (SPG) are computed from the Foster-Greer-Thorbecke (FGT) class of poverty measures.

$$P\alpha = \frac{1}{n}\sum(1-(Xi/Z))^{\alpha}$$

Where

Xi	=	the per capita expenditure for those individuals who are below the poverty line and zero for those above poverty line
Z	=	the poverty line
n	=	the total population
α	=	0 for the Head Count Index, 1 for Poverty Gap and 2 for Squared Poverty Gap

1) When $\alpha = 0$ that is P_0 is Poverty Incidence,

Let us take an example of Kalika, Where

Population (n)	= 4470,
Per capita income (Xi)	= Nrs. 3673
Poverty line (Z)	= Nrs. 4404 (poverty line for Nepal 1998 is Nrs. 4404)

P_0 = 1/4470 $\{(1-3673/4404)^0 + \{(1-3673/4404)^0 + (1-3673/4404)^0 + (1-3673/4404)^0 + \ldots\ldots 4470 \text{ times}\}$

= 1/4470 $\{(1 + 1 + 1 + 1 + \ldots\ldots 4470 \text{ times})\}$

= 1/4470 * 4470

= 1

Note - Something to the power zero is 1, and hence $\{(1-3673/4404)^0\} = 1$

- Average per capita income of village is 3673 less than the poverty line and each value is taken into account 4470 times separately for summation which is equal to the number of population.

2) When $\alpha = 1$ that is P_1 is Poverty Gap

Therefore Poverty Gap (P_1) for the same values,

P_1 = 1/4470 $\{(1-3673/4404)^1 + \{(1-3673/4404)^1 + (1-3673/4404)^1 + (1-3673/4404)^1 + \ldots\ldots 4470 \text{ times}\}$

= 1/4470 $\{(0.165 + 0.165 + 0.165 + 0.165 + \ldots\ldots 4470 \text{ times})\}$

= 1/4470 (737.55)

= 0.165

$= \quad 0.17$

3) When $\alpha = 2$ that is P_2 is Squared Poverty Gap

Therefore Squared Poverty Gap (P_2) for the same values,

$P_2 = 1/4470 \{(1-3673/4404)^2 + \{(1-3673/4404)^2 + (1-3673/4404)^2 + (1-3673/4404)^2 + \ldots\ldots 4470 \text{ times}\}$

$= 1/4470 \{(0.027 + 0.027 + 0.027 + 0.027 + \ldots\ldots 4470 \text{ times})\}$

$= 1/4470 (121.696)$

$= 0.027$

$= 0.03$

2 Composite Index Computation

A) Indicator value Transformation, 0 to 1 scoring transformation method.

1) Case when the well being is directly proportional to the indicator, (1 to 0 i.e. maximum value to 1ero and minimum value to 0)

Let us take an example of annual average per capita income

Maximum value of annual per capita income = 12655 (Dangsing)
Minimum value of annual per capita income = 729 (Ghandruk)

i) When Xij = Xi(max)

$$Xij = \frac{Xij - Xi(\min)}{Xi(\max) - Xi(\min)}$$

$$= \frac{12655 - 726}{12655 - 726}$$

$$= 1$$

ii) When Xij = Xij(min)

$$Xij = \frac{Xij - Xi(\min)}{Xi(\max) - Xi(\min)}$$

$$= \frac{726 - 726}{12655 - 726}$$

$$= \frac{0}{11929}$$

$$= 0$$

Similarly other values can be computed.

2) In the case where well being is inversely proportional to the indicator (0 to zero 1 transformation, i.e. maximum value to 0 and minimum value to 1)

Let us take an example of percentage of thatched roof houses in VDCs

Maximum value of percentage of thatched roof houses in the VDCs (Sarangkot) = 97.1

Minimum value of percentage of thatched roof houses in the VDCs (Thumki) = 25.4

i) When Xij = Xi(max)

$$Xij = \frac{Xi(\max) - Xij}{Xi(\max) - Xi(\min)}$$

$$Xij = \frac{97.1 - 97.1}{97.1 - 25.4}$$

$$= \frac{0}{71.1}$$

$$= 0$$

ii) When Xij = Xij(min)

$$Xij = \frac{Xi(\max) - Xij}{Xi(\max) - Xi(\min)}$$

$$= \frac{97.1 - 25.4}{97.1 - 25.4}$$

$$= \frac{71.1}{71.1}$$

$$= 1$$

In this case the highest value of the indicator is transformed to got 0 TV and minimum value is transformed to 1 the highest TV, exactly reverse of the previous case. Similarly, other values can be computed without changing the order.

Therefore, in both the cases 1 exhibits the best condition and 0 exhibits the poorest condition preserving their initial order. The transformed value is free of unit.

B) Composite Index Computation

Transformed Value (TV) of indicators of Kalika VDC is taken for computation. The TVs of the indicators in the sectoral indicators are the same as given in the CI_1, CI_2 and CI_3, therefore the values are not written to avoid repetition.

1) Social wellbeing Index or indicator directly reflecting poverty (CI_1)

1. Household farm size in ha(X_4) = 0.78
2. Percentage of households with food deficiency from 3 to 9 months (Y_5)= 0.36
3. Percentage of thatched roof house (Y_7) = 0.75
4. Percentage of Lower cast population (Y_{11}) = 0.76

2) Natural resources sector (CI_2)

1. Percentage of areas above 30 degree slope (Y_{20}) = 0.52
2. Percentage of cultivated area (X_{21}) = 0.68

3. Per capita forest area (X_{22}) = 0.38
4. Percentage of grass land area (X_{23}) = 0.15
5. Gross rural population density (X_{24}) = 0.34

3) Social sector (CI_3)

1. Employment rate generated from secondary and tertiary sectors (X2) = 0.35
1. Drinking water coverage (X_{12}) = 0.43
2. Percentage of household with electricity (X_{14}) = 0.48
5. Percentage of thatched roof house(X_7) = 0.75

4) Infrastructure and institution sector (CI_4)

3. Percentage of irrigated area (X_{13}) = 0.41
4. Road access time from VDC to road-head (X_{15}) = 0.22
1. Road density(X_{16}) = 0.22
5. Bank service available per 1000 people(X_{17}) = 0.00
6. Cooperatives service available per 1000 people(X_{18}) = 0.00
7. Agriculture Centers providing services available to 1000 people(X_{194}) = 0.00

5) Women empowerment (CI_5)

1. Percentage of female workers in non agricultural occupation (X_3) = 0.13
2. Percentage of females in Literacy (10 + years) (X_9) = 0.77
3. Percentage of girls in primary education(X_{10}) = 0.89

6) group indicator reflecting development level of the VDC and indirect measure of poverty (CI_6)

8. Employment rate generated from secondary and tertiary sectors (X2) = 0.35
9. Percentage of female workers in non agricultural occupation (X_3) = 0.13
10. Livestock (large and small ruminants) per farm household (X_6) = 0.16
11. Overall literacy rate (X_8) = 0.79
12. Percentage of females in Literacy (10 + years) (X_9) = 0.77
13. Percentage of girls in primary education (X_{10}) = 0.89
14. Drinking water coverage (X_{12}) = 0.43
15. Percentage of irrigated area (X_{13}) = 0.41
16. Percentage of household with electricity (X_{14}) = 0.48
17. Road access time from VDC to road-head (Y_{15}) = 1.00
18. Road density (X_{16}) = 0.22
19. Bank service available per 1000 people (X_{17}) = 0.00
20. Cooperatives service available per 1000 people (X_{18}) = 0.00
21. Agriculture centers providing services available to 1000 people (X_{19}) = 0.00
22. Gross rural population density (X_{24}) = 0.34

Composite Indices are computed for each group indicator or sectoral indicator. The composite index is the mean of the transformed value (TV) of the constituting indicators. The suffix X and Y at the end of each indicator above denotes the transformed value. Xi is the transformed value of indicator, which is directly proportional to the wellbeing and Yi is the indicator, which is inversely proportional to the wellbeing. The number suffixed with X

and Y shows the serial number of the indicator. In both X and Y the suffix number is according to the corresponding serial number.

Therefore,

If the composite indices are CI_1, CI_2, CI_3, CI_4, CI_5, and CI_6 for the indicators and Xi and Yi are the transformed value of the indicators as shown above, then

SWI (CI_1) $= (X_4 + Y_5 + Y_7 + Y_{11}) / 4$ Equation 3.4
$= (0.78 + 0.36 + 0.75 + 0.76)/4$
$= 0.66$

NRS (CI_2) $= (Y_{20} + X_{21} + X_{22} + X_{23} + X_{24}) / 5$ Equation 3.5
$= (0.52 + 0.68 + 0.38 + 0.15 + 0.34)/5$
$= 0.414$

SS (CI_3) $= (X_2 + X_8 + X_{12} + X_{14})/4$ Equation 6.3
$= (0.35 + 0.79 + 0.43 + 0.48)/4$
$= 0.51$

IIS (CI_4) $= (X_{13} + Y_{15} + X_{16} + X_{17} + X_{18} + X_{19}) / 6$ Equation 6.4
$= (0.41 + 1.00 + 0.22 + 0.00 + 0.00 + 0.00)/6$
$= 0.27$

WES (CI_5) $= (X_3 + Y_9 + X_{10}) / 3$ Equation 6.5
$= (0.13+0.77+0.89) / 3$
$= 0.597$

ADS (CI_6) $= (X_2 + X_3 + X_6 + X_8 + Y_9 + X_{10} + X_{12} + X_{13} + X_{14} + Y_{15} + X_{16} + X_{17} + X_{18} + X_{19} + X_{24}) / 15$ Equation 6.6
$= (0.35 + 0.13 + 0.16 + 0.79 + 0.77 + 0.89 + 0.43 + 0.41 + 0.48 + 1.00 + 0.22 + 0.00 + 0.00 + 0.00 + 0.34)/15$
$= 0.398$

Social Wellbeing Index

Table 10.1 Indicator Value and TV, computed Using 0 to 1 Scoring Transformation

S.no	VDC	Farm-size		Food-def 3-9 month		Thatched roof		Lc-pop		CI_1
		Ha	TV (X_4)	HH %	TV (Y_5)	%	TV (Y_7)	%	TV (Y_{11})	
1	Arbabijaya	0.41	0.27	71	0.20	9.6	0.90	2.59	0.63	0.50
2	Armala	0.51	0.42	68.8	0.24	6.4	0.95	4.04	0.37	0.49
3	Bhachok	0.75	0.80	41.5	0.66	47.4	0.38	2.65	0.62	0.61
4	Bhadauretamagi	0.87	0.98	44.6	0.61	26.9	0.66	3.56	0.45	0.68
5	Bhalam	0.47	0.36	77.6	0.10	4.7	0.97	1.23	0.87	0.58
6	Bharatpokhari	0.71	0.73	50.8	0.51	19.2	0.77	2.95	0.56	0.65
7	Chapakot	0.6	0.56	74.2	0.15	33.1	0.58	3.73	0.42	0.43
8	Dangsing	0.42	0.28	42	0.65	38.9	0.50	4.55	0.28	0.43
9	Deurali	0.6	0.56	71	0.20	49.2	0.35	2.52	0.64	0.44
10	Dhampus	0.54	0.47	70.2	0.22	34.2	0.56	6.09	0.00	0.31
11	Dhikurpokhari	0.7	0.72	60.6	0.36	14.4	0.84	3.6	0.45	0.59
12	Dhital	0.87	0.98	57.8	0.41	20.3	0.75	0.5	1.00	0.79
13	Ghachok	0.48	0.38	66.4	0.27	20.5	0.75	4.46	0.29	0.42
14	Ghandruk	0.58	0.53	84.2	0.00	21	0.74	4.14	0.35	0.41
15	Hansapur	0.77	0.83	37	0.73	60.5	0.20	4.67	0.25	0.50
16	Hemja	0.57	0.52	55	0.45	2.6	1.00	1.45	0.83	0.70
17	Kahu	0.52	0.44	70	0.22	9.2	0.91	1.93	0.74	0.58
18	kalika	[illegible]	[illegible]	61	0.36	20.9	0.75	1.86	0.76	0.66
19	Kaskikot	0.7	0.72	69	0.23	25.3	0.68	2.13	0.71	0.59
20	Kristinachne	0.71	0.73	81.4	0.04	20.7	0.75	1.67	0.79	0.58
21	Lahachok	0.52	0.44	72	0.19	17.9	0.79	3.51	0.46	0.47
22	Lamachaur	0.52	0.44	76	0.13	6.2	0.95	2.91	0.57	0.52
23	Lumle	0.38	0.22	44	0.62	21.6	0.74	6.03	0.01	0.40
24	Lwangghalel	0.46	0.34	57.2	0.42	26.3	0.67	3.35	0.49	0.48
25	Machhapuchre	0.88	1.00	52.5	0.49	36.9	0.52	2.61	0.62	0.66
26	Majhthatna	0.62	0.59	69.2	0.23	42.2	0.45	1.4	0.84	0.53
27	Mauja	0.76	0.81	59.4	0.38	23.9	0.70	3.34	0.49	0.60
28	Mijuredanda	0.79	0.86	19.3	1.00	52.1	0.31	4.64	0.26	0.61
29	Namarjung	0.7	0.72	48	0.56	13.9	0.84	2.34	0.67	0.70
30	Nirmalpokhari	0.6	0.56	69.3	0.23	37.5	0.52	3.18	0.52	0.46
31	Parche	0.41	0.27	61	0.36	12.7	0.86	3.76	0.42	0.47
32	Pumdi Bhumdi	0.55	0.48	81.7	0.04	14.4	0.84	3.31	0.50	0.46
33	Puranchaur	0.54	0.47	61.5	0.35	12.3	0.87	3	0.55	0.56
34	Rivan	0.7	0.72	54.3	0.46	13.9	0.84	3.8	0.41	0.61
35	Rupakot	0.24	0.00	53.7	0.47	60.6	0.19	1.59	0.81	0.37
36	Saimarang	0.64	0.63	62	0.34	59.3	0.21	5.5	0.11	0.32
37	Salyan	0.45	0.33	74	0.16	20.6	0.75	4.94	0.21	0.36
38	Sarangkot	0.38	0.22	69.2	0.23	2.9	1.00	2.5	0.64	0.52
39	Sardikhola	0.38	0.22	43.3	0.63	9.3	0.91	1.26	0.86	0.65
40	Siddha	0.46	0.34	70.5	0.21	63.1	0.16	2.03	0.73	0.36
41	Sildujure	0.54	0.47	80.2	0.06	40.8	0.47	4.16	0.35	0.34
42	Thumakotdanda	0.65	0.64	45	0.60	36.7	0.53	3.71	0.43	0.55
43	Thumki	0.71	0.73	35.5	0.75	74.6	0.00	2.25	0.69	0.54

Source: Raw Data and Computation

Note Yi inversely related to Wellbeing = (MAX (Yi) -Yi)/(MAX (Yi) - MIN(Yi)
Xi directly related to Wellbeing = (Xi-MIN(Xi))/(MAX(Xi)-MIN(Xi)

Table 10.2 Indicator Value and TV, computed Using 0 to 1 Scoring Transformation

S.no	VDC	Area-ab-30		Culti-area		Forest area		Grass land		Pop-den		CI_2
		%	TV (Y_{20})	%	TV (X_{21})	%	TV (X_{22})	%	TV (X_{23})	per/Km2	TV (X_{24})	
1	Arbabijaya	53.16	0.52	52.63	0.65	42.11	0.50	0.00	0.00	237.7	0.41	0.417
2	Armala	58.39	0.45	44.83	0.55	46.67	0.59	8.51	0.22	167.2	0.29	0.420
3	Bhachok	71.55	0.29	55.17	0.69	44.83	0.55	0.00	0.00	81.14	0.13	0.332
4	Bhadauretamagi	63.99	0.38	30.57	0.37	69.43	0.99	0.00	0.00	292.2	0.51	0.451
5	Bhalam	38.28	0.70	64.84	0.81	35.16	0.38	0.00	0.00	304	0.53	0.485
6	Bharatpokhari	51.25	0.54	43.44	0.53	50.16	0.65	6.09	0.16	262	0.46	0.468
7	Chapakot	60.50	0.43	51.72	0.64	46.71	0.59	0.00	0.00	71.46	0.12	0.354
8	Dangsing	76.17	0.23	25.55	0.30	66.82	0.95	7.63	0.20	36.42	0.06	0.347
9	Deurali	68.66	0.33	53.92	0.67	46.08	0.57	0.00	0.00	185.4	0.32	0.378
10	Dhampus	76.13	0.23	53.15	0.66	46.85	0.59	0.00	0.00	164	0.28	0.352
11	Dhikurpokhari	41.10	0.67	59.51	0.74	40.49	0.47	0.00	0.00	267.3	0.47	0.470
12	Dhital	94.71	0.00	75.88	0.95	18.24	0.08	5.29	0.14	235.7	0.41	0.314
13	Ghachok	70.16	0.31	43.55	0.54	41.94	0.50	13.71	0.36	438.6	0.77	0.493
14	Ghandruk	52.57	0.53	6.02	0.05	23.45	0.17	21.39	0.55	19.04	0.02	0.266
15	Hansapur	54.65	0.50	57.56	0.72	40.99	0.48	0.00	0.00	131.2	0.22	0.385
16	Hemja	47.26	0.59	47.87	0.59	43.90	0.54	5.18	0.13	568.9	1.00	0.571
17	Kahu	24.64	0.88	79.71	1.00	20.29	0.11	0.00	0.00	341.6	0.60	0.517
18	kalika	52.99	0.52	54.48	0.68	35.45	0.38	5.60	0.15	194.1	0.34	0.412
19	Kaskikot	25.83	0.86	75.42	0.94	18.75	0.08	5.83	0.15	213.5	0.37	0.482
20	Kristinachnecha	44.55	0.63	60.44	0.75	36.76	0.41	2.80	0.07	238	0.41	0.454
21	Lahachok	48.25	0.58	69.30	0.87	14.04	0.00	16.67	0.43	360.3	0.63	0.502
22	Lamachaur	14.67	1.00	62.67	0.78	17.33	0.06	20.00	0.52	481.6	0.85	0.641
23	Lumle	59.16	0.44	10.81	0.12	37.96	0.43	16.70	0.43	17.12	0.02	0.289
24	Lwangghalel	88.97	0.07	16.20	0.18	69.57	1.00	13.68	0.35	37.48	0.06	0.333
25	Machhapuchre	46.24	0.61	1.80	0.00	34.22	0.36	38.56	1.00	6.04	0.00	0.394
26	Majhthatna	54.73	0.50	61.73	0.77	36.63	0.41	0.00	0.00	295.4	0.51	0.438
27	Mauja	49.74	0.56	68.21	0.85	30.26	0.29	1.54	0.04	212.4	0.37	0.422
28	Mijuredanda	81.51	0.16	24.52	0.29	69.25	0.99	6.24	0.16	116.3	0.20	0.361
29	Namarjung	59.54	0.44	4.09	0.03	48.91	0.63	10.44	0.27	5.16	0.00	0.273
30	Nirmalpokhari	55.02	0.50	63.32	0.79	29.69	0.28	6.99	0.18	376.6	0.66	0.481
31	Parche	58.16	0.46	9.34	0.10	50.21	0.65	6.62	0.17	49.93	0.08	0.291
32	Pumdi Bhumdi	41.20	0.67	50.69	0.63	48.15	0.61	0.00	0.00	296.5	0.52	0.485
33	Puranchaur	56.18	0.48	32.21	0.39	58.05	0.79	8.24	0.21	161.7	0.28	0.430
34	Rivan	52.17	0.53	52.17	0.65	36.65	0.41	11.18	0.29	116.3	0.20	0.414
35	Rupakot	70.28	0.31	48.25	0.60	49.65	0.64	0.00	0.00	236.3	0.41	0.390
36	Saimarang	80.14	0.18	34.49	0.42	64.81	0.91	0.70	0.02	134.1	0.23	0.352
37	Salyan	38.07	0.71	55.11	0.68	40.34	0.47	4.55	0.12	241.5	0.42	0.480
38	Sarangkot	39.45	0.69	62.28	0.78	32.87	0.34	4.84	0.13	352	0.62	0.509
39	Sardikhola	77.76	0.21	18.60	0.22	69.81	1.00	10.78	0.28	63.07	0.10	0.362
40	Siddha	55.92	0.48	39.34	0.48	55.45	0.74	0.00	0.00	156	0.27	0.395
41	Sildujure	64.69	0.38	33.66	0.41	65.68	0.93	0.66	0.02	104	0.18	0.380
42	Thumakotdanda	62.67	0.40	48.80	0.60	49.33	0.63	1.60	0.04	109.6	0.19	0.373
43	Thumki	55.11	0.49	52.63	0.65	41.49	0.49	0.00	0.00	115	0.19	0.367

Source: Raw Data and Computation

Note Yi inversely related to Wellbeing = (MAX (Yi) -Yi)/(MAX (Yi) - MIN(Yi)
Xi directly related to Wellbeing = (Xi-MIN(Xi))/(MAX(Xi)-MIN(Xi)

Social Sector

Table 10.3 Indicator Value and TV, computed Using 0 to 1 Scoring Transformation

S.no	VDC	Employ. Rat		Literacy rate		Drinkng water cov.		Electricity benef		CI_3
		%	TV (X_2)	%	TV (X_8)	%	TV (X_{12})	%	TV (X_{14})	
1	Arbabijaya	1	0.00	67.93	0.85	57.17	0.36	55.71	0.56	0.442
2	Armala	7.5	0.65	61.79	0.77	88.72	0.83	49.93	0.50	0.688
3	Bhachok	1	0.00	68.05	0.85	100.00	1.00	0.00	0.00	0.463
4	Bhadauretamagi	1	0.00	65.03	0.81	88.72	0.83	1.91	0.02	0.416
5	Bhalam	5.5	0.45	79.28	1.00	85.86	0.79	50.27	0.50	0.685
6	Bharatpokhari	5	0.40	74.72	0.94	54.10	0.31	52.17	0.52	0.543
7	Chapakot	7.5	0.65	61.33	0.77	70.08	0.55	89.28	0.89	0.715
8	Dangsing	2.5	0.15	53.12	0.66	93.55	0.90	0.00	0.00	0.428
9	Deurali	8	0.70	65.88	0.83	80.84	0.71	0.00	0.00	0.559
10	Dhampus	6.5	0.55	62.9	0.79	90.22	0.85	38.13	0.38	0.643
11	Dhikurpokhari	2.5	0.15	68.35	0.86	47.04	0.21	37.79	0.38	0.398
12	Dhital	4	0.30	59.24	0.74	93.72	0.91	0.00	0.00	0.486
13	Ghachok	1	0.00	67.95	0.85	94.77	0.92	49.85	0.50	0.568
14	Ghandruk	1	0.00	57.5	0.72	53.86	0.31	5.02	0.05	0.268
15	Hansapur	4	0.30	9.21	0.09	52.04	0.28	4.85	0.05	0.179
16	Hemja	2	0.10	70.1	0.88	94.15	0.91	72.79	0.73	0.655
17	Kahu	6	0.50	76.35	0.96	92.50	0.89	100.00	1.00	0.837
18	kalika	4.5	0.35	63.38	0.79	62.27	0.43	48.46	0.48	0.515
19	Kaskikot	2	0.10	49.21	0.61	59.80	0.40	48.98	0.49	0.399
20	Kristinachnechau	9	0.80	74.06	0.93	73.61	0.60	26.43	0.26	0.650
21	Lahachok	6	0.50	62.68	0.78	97.23	0.96	13.27	0.13	0.594
22	Lamachaur	7.5	0.65	72.22	0.91	43.21	0.15	85.93	0.86	0.641
23	Lumle	6.5	0.55	58.81	0.73	92.06	0.88	0.00	0.00	0.541
24	Lwangghalel	3.5	0.25	53.06	0.66	94.09	0.91	0.00	0.00	0.455
25	Machhapuchre	1	0.00	60.72	0.76	93.18	0.90	0.00	0.00	0.414
26	Majhthatna	3	0.20	71.52	0.90	41.26	0.12	0.00	0.00	0.304
27	Mauja	6	0.50	55.43	0.69	58.49	0.38	13.38	0.13	0.425
28	Mijuredanda	7	0.60	38.67	0.47	66.90	0.50	0.00	0.00	0.393
29	Namarjung	8.2	0.72	36.67	0.44	70.06	0.55	0.00	0.00	0.429
30	Nirmalpokhari	7	0.60	67.42	0.85	33.33	0.00	66.21	0.66	0.527
31	Parche	1	0.00	59.53	0.74	75.16	0.63	28.50	0.29	0.414
32	Pumdi Bhumdi	6.5	0.55	68.51	0.86	83.04	0.75	27.28	0.27	0.607
33	Puranchaur	7	0.60	71.33	0.90	91.33	0.87	0.00	0.00	0.592
34	Rivan	1	0.00	55.8	0.69	56.10	0.34	0.00	0.00	0.259
35	Rupakot	5	0.40	62.52	0.78	55.18	0.33	5.95	0.06	0.392
36	Saimarang	2	0.10	58.03	0.72	94.98	0.92	0.00	0.00	0.437
37	Salyan	8.5	0.75	63	0.79	67.47	0.51	0.00	0.00	0.512
38	Sarangkot	7	0.60	65.1	0.81	90.94	0.86	58.00	0.58	0.715
39	Sardikhola	6.5	0.55	63.81	0.80	98.82	0.98	0.00	0.00	0.583
40	Siddha	3.5	0.25	21.34	0.24	45.00	0.18	0.00	0.00	0.167
41	Sildujure	1	0.00	51.48	0.64	82.90	0.74	0.00	0.00	0.345
42	Thumakotdanda	6.5	0.55	65.29	0.82	88.65	0.83	0.00	0.00	0.549
43	Thumki	11	1.00	2.65	0.00	83.89	0.76	0.00	0.00	0.440

Source: Raw Data and Computation

Note Xi directly related to Wellbeing = (Xi-MIN(Xi))/(MAX(Xi)-MIN(Xi)

Table 10.4 Indicator Value and TV, computed Using 0 to 1 Scoring Transformation

S.no	VDC	Irrigated area		Road-dis		Road density		Bank		Cooperatives		Agri-center		CI_4
		%	TV (X_{13})	Hrs	TV (Y_{15})	Km/KM2	TV (X_{16})	per 1000	TV (X_{17})	per 1000	TV (X_{18})	per 1000	TV (X_{19})	
1	Arbabijaya	5.98	0.04	1	0.80	0.67	0.25	0	0.00	0	0.00	0	0.00	0.1
2	Armala	63.49	0.52	0	1.00	0.11	0.04	0	0.00	0.5	0.32	0	0.00	0.3
3	Bhachok	35.44	0.29	1	0.80	0	0.00	0	0.00	0	0.00	0	0.00	0.1
4	Bhadauretamagi	18.57	0.14	3	0.40	0.92	0.35	0.05	0.33	0	0.00	0	0.00	0.2
5	Bhalam	61.86	0.51	1	0.80	0.31	0.12	0.09	0.60	0.33	0.21	0.09	1.00	0.5
6	Bharatpokhari	52.83	0.43	1	0.80	0.04	0.02	0	0.00	0.21	0.13	0	0.00	0.2
7	Chapakot	46.06	0.38	3	0.40	0	0.00	0.05	0.33	0	0.00	0	0.00	0.1
8	Dangsing	4.88	0.03	4	0.20	0	0.00	0	0.00	0	0.00	0	0.00	0.0
9	Deurali	38.43	0.31	1	0.80	0	0.00	0.15	1.00	0	0.00	0	0.00	0.3
10	Dhampus	46.17	0.38	3	0.40	0.35	0.13	0.05	0.33	0.34	0.22	0.05	0.56	0.3
11	Dhikurpokhari	55.51	0.46	0	1.00	2.63	1.00	0.05	0.33	0.48	0.31	0.05	0.56	0.6
12	Dhital	23.69	0.19	3	0.40	0.3	0.11	0.05	0.33	0	0.00	0.05	0.56	0.2
13	Ghachok	64.51	0.53	2.5	0.50	0.99	0.38	0.13	0.87	0.37	0.24	0.06	0.67	0.5
14	Ghandruk	120	1.00	5	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0.1
15	Hansapur	77.9	0.64	1	0.80	0.16	0.06	0	0.00	1.27	0.81	0	0.00	0.3
16	Hemja	64.56	0.53	1	0.80	0.83	0.32	0.13	0.87	0.4	0.25	0.06	0.67	0.5
17	Kahu	8.27	0.06	1	0.80	0.34	0.13	0.09	0.60	0	0.00	0.09	1.00	0.4
18	kalika	49.58	0.41	0	1.00	0.58	0.22	0	0.00	0	0.00	0	0.00	0.2
19	Kaskikot	47.56	0.39	0	1.00	0	0.00	0.05	0.33	0.35	0.22	0	0.00	0.3
20	Kristinachnecha	42.19	0.34	2	0.60	0.37	0.14	0.06	0.40	0	0.00	0	0.00	0.2
21	Lahachok	85.71	0.71	2	0.60	1.19	0.45	0.13	0.87	0.24	0.15	0.06	0.67	0.5
22	Lamachaur	65.99	0.54	0	1.00	0.1	0.04	0.09	0.60	1.57	1.00	0.09	1.00	0.7
23	Lumle	1.49	0.00	0	1.00	0.75	0.29	0	0.00	0	0.00	0	0.00	0.2
24	Lwangghalel	108.5	0.90	4	0.20	0.01	0.00	0.05	0.33	0	0.00	0.05	0.56	0.3
25	Machhapuchre	77.34	0.64	3	0.40	0.02	0.01	0	0.00	0	0.00	0	0.00	0.1
26	Majhthatna	52.77	0.43	0	1.00	0.33	0.13	0	0.00	0	0.00	0	0.00	0.2
27	Mauja	56.98	0.47	2	0.60	0	0.00	0.09	0.60	0	0.00	0.09	1.00	0.4
28	Mijuredanda	85.47	0.71	3	0.40	0	0.00	0	0.00	0	0.00	0	0.00	0.1
29	Namarjung	70.97	0.59	3	0.40	0	0.00	0	0.00	0	0.00	0.07	0.78	0.2
30	Nirmalpokhari	46.63	0.38	1	0.80	0.22	0.08	0.06	0.40	0	0.00	0	0.00	0.2
31	Parche	90.81	0.75	4	0.20	0	0.00	0	0.00	0	0.00	0.07	0.78	0.2
32	Pumdi Bhumdi	40.84	0.33	0	1.00	0	0.00	0.06	0.40	0.88	0.56	0	0.00	0.3
33	Puranchaur	85.68	0.71	1	0.80	0.27	0.10	0	0.00	0.97	0.62	0	0.00	0.3
34	Rivan	49.43	0.40	3	0.40	0.13	0.05	0.13	0.87	0	0.00	0.06	0.67	0.4
35	Rupakot	36.95	0.30	1	0.80	0.17	0.06	0.15	1.00	0	0.00	0	0.00	0.3
36	Saimarang	24.48	0.19	1	0.80	0	0.00	0	0.00	0	0.00	0	0.00	0.1
37	Salyan	14.75	0.11	3	0.40	2.45	0.93	0	0.00	0.25	0.16	0	0.00	0.2
38	Sarangkot	41.05	0.33	0	1.00	0.29	0.11	0.05	0.33	0.17	0.11	0	0.00	0.3
39	Sardikhola	75.53	0.62	2	0.60	0.12	0.05	0	0.00	0	0.00	0	0.00	0.2
40	Siddha	76.55	0.63	3	0.40	0	0.00	0.15	1.00	0	0.00	0	0.00	0.34
41	Sildujure	68.08	0.56	1.5	0.70	0	0.00	0	0.00	0	0.00	0.07	0.78	0.34
42	Thumakotdanda	94.2	0.78	3	0.40	0.1	0.04	0	0.00	0.22	0.14	0.07	0.78	0.36
43	Thumki	64.64	0.53	1	0.80	0	0.00	0.15	1.00	0	0.00	0	0.00	0.35

Source: Raw Data and Computation

Note Yi inversely related to Wellbeing = (MAX (Yi) -Yi)/(MAX (Yi) - MIN(Yi)
Xi directly related to Wellbeing = (Xi-MIN(Xi))/(MAX(Xi)-MIN(Xi)

Women Empowerment Sector

Table 10.5 Indicator Value and TV, computed Using 0 to 1 Scoring Transformation

S.no	VDC	Female Illiteracy		Girls in Prim. School		Female in Non-agri.		CI_5
		%	TV (Y_9)	%	TV (X_{10})	%	TV (X_3)	
1	Arbabijaya	42.16	0.84	41.94	0.75	0	0.00	0.529
2	Armala	49.78	0.72	48.96	0.87	4.04	0.39	0.663
3	Bhachok	41.49	0.85	45.91	0.82	0	0.00	0.556
4	Bhadauretamagi	42.98	0.83	45.08	0.81	0	0.00	0.544
5	Bhalam	31.34	1.00	48.73	0.87	1.6	0.16	0.675
6	Bharatpokhari	34.50	0.95	50.02	0.89	0.6	0.06	0.635
7	Chapakot	49.12	0.73	45.32	0.81	1.3	0.13	0.556
8	Dangsing	55.01	0.64	44.97	0.80	5.8	0.56	0.670
9	Deurali	45.79	0.78	48.86	0.87	1.8	0.17	0.610
10	Dhampus	51.06	0.70	43.38	0.78	5.5	0.53	0.671
11	Dhikurpokhari	40.07	0.87	47.8	0.85	1.5	0.15	0.623
12	Dhital	54.29	0.66	47.9	0.86	2.2	0.21	0.575
13	Ghachok	40.99	0.85	46.38	0.83	0	0.00	0.561
14	Ghandruk	49.06	0.73	48.5	0.87	0	0.00	0.533
15	Hansapur	90.52	0.11	55.17	0.99	0.7	0.07	0.388
16	Hemja	39.92	0.87	49.61	0.89	1.2	0.12	0.625
17	Kahu	36.08	0.93	48.39	0.86	2.3	0.22	0.672
18	kalika	46.69	0.77	49.86	0.89	1.3	0.13	0.595
19	Kaskikot	61.61	0.55	41.64	0.74	0	0.00	0.430
20	Kristinachnechau	35.02	0.94	43.6	0.78	2.6	0.25	0.659
21	Lahachok	47.52	0.76	47.27	0.84	1	0.10	0.566
22	Lamachaur	35.87	0.93	55.97	1.00	0.8	0.08	0.670
23	Lumle	46.12	0.78	46.19	0.83	10.3	1.00	0.868
24	Lwangghalel	58.43	0.59	40.63	0.73	1.1	0.11	0.475
25	Machhapuchre	51.67	0.69	42.6	0.76	0.6	0.06	0.505
26	Majhthatna	37.96	0.90	49.78	0.89	0.9	0.09	0.626
27	Mauja	59.57	0.58	34.87	0.62	0.6	0.06	0.419
28	Mijuredanda	67.78	0.45	43.49	0.78	1.7	0.17	0.465
29	Namarjung	68.25	0.45	54.21	0.97	2.3	0.22	0.546
30	Nirmalpokhari	43.99	0.81	46.3	0.83	1.4	0.14	0.591
31	Parche	66.97	0.46	41.04	0.73	0.3	0.03	0.409
32	Pumdi Bhumdi	44.6	0.80	47	0.84	0.9	0.09	0.576
33	Puranchaur	38.07	0.90	47.43	0.85	2.8	0.27	0.673
34	Rivan	60.11	0.57	43.96	0.79	0	0.00	0.451
35	Rupakot	51.57	0.70	41.27	0.74	0	0.00	0.478
36	Saimarang	51.02	0.70	46.27	0.83	0	0.00	0.510
37	Salyan	47.85	0.75	49.87	0.89	1.8	0.17	0.606
38	Sarangkot	46.91	0.77	49	0.88	3.7	0.36	0.667
39	Sardikhola	50.84	0.71	44.33	0.79	3.5	0.34	0.613
40	Siddha	82.7	0.23	44.84	0.80	0.4	0.04	0.356
41	Sildujure	61.26	0.55	40.16	0.72	0.4	0.04	0.436
42	Thumakotdanda	46.61	0.77	44.6	0.80	1.7	0.17	0.577
43	Thumki	97.87	0.00	0	0.00	0	0.00	0.000

Source: Raw Data and Computation

Note Yi inversely related to Wellbeing = (MAX (Yi) -Yi)/(MAX (Yi) - MIN(Yi)
Xi directly related to Wellbeing = (Xi-MIN(Xi))/(MAX(Xi)-MIN(Xi)

Aggregate Development Sector

Table 10.6 Indicator Value and TV, computed Using 0 to 1 Scoring Transformation*

S. no	VDC	Employment rate		Female in N-agri		Livestock		Literacy		Female Illiteracy		Girls in Prim. Schol		Drinking water cov.	
		%	TV (X_2)	%	TV (X_3)	No/ HH	TV (X_6)	%	TV (X_8)	%	TV (Y_9)	%	TV (X_{10})	%	TV (X_{12})
1	Arbabijaya	1	0.00	0	0.00	3.52	0.10	67.93	0.85	42.16	0.84	41.94	0.75	57.17	0.36
2	Armala	7.5	0.65	4.04	0.39	3.71	0.11	61.79	0.77	49.78	0.72	48.96	0.87	88.72	0.83
3	Bhachok	1	0.00	0	0.00	4.7	0.14	68.05	0.85	41.49	0.85	45.91	0.82	100.00	1.00
4	Bhadauretama	1	0.00	0	0.00	4	0.12	65.03	0.81	42.98	0.83	45.08	0.81	88.72	0.83
5	Bhalam	5.5	0.45	1.6	0.16	3.17	0.09	79.28	1.00	31.34	1.00	48.73	0.87	85.86	0.79
6	Bharatpokhari	5	0.40	0.6	0.06	4.93	0.15	74.72	0.94	34.5	0.95	50.02	0.89	54.10	0.31
7	Chapakot	7.5	0.65	1.3	0.13	4.24	0.13	61.33	0.77	49.12	0.73	45.32	0.81	70.08	0.55
8	Dangsing	2.5	0.15	5.8	0.56	1.56	0.03	53.12	0.66	55.01	0.64	44.97	0.80	93.55	0.90
9	Deurali	8	0.70	1.8	0.17	4.67	0.14	65.88	0.83	45.79	0.78	48.86	0.87	80.84	0.71
10	Dhampus	6.5	0.55	5.5	0.53	3.29	0.09	62.9	0.79	51.06	0.70	43.38	0.78	90.22	0.85
11	Dhikurpokhari	2.5	0.15	1.5	0.15	4.02	0.12	68.35	0.86	40.07	0.87	47.8	0.85	47.04	0.21
12	Dhital	4	0.30	2.2	0.21	3.44	0.10	59.24	0.74	54.29	0.66	47.9	0.86	93.72	0.91
13	Ghachok	1	0.00	0	0.00	7.94	0.26	67.95	0.85	40.99	0.85	46.38	0.83	94.77	0.92
14	Ghandruk	1	0.00	0	0.00	7.24	0.23	57.5	0.72	49.06	0.73	48.5	0.87	53.86	0.31
15	Hansapur	4	0.30	0.7	0.07	7.3	0.23	9.21	0.09	90.52	0.11	55.17	0.99	52.04	0.28
16	Hemja	2	0.10	1.2	0.12	2.72	0.07	70.1	0.88	39.92	0.87	49.61	0.89	94.15	0.91
17	Kahu	6	0.50	2.3	0.22	4.63	0.14	76.35	0.96	36.08	0.93	48.39	0.86	92.50	0.89
18	kalika	4.5	0.35	1.3	0.13	5.17	0.16	63.38	0.79	46.69	0.77	49.86	0.89	62.27	0.43
19	Kaskikot	2	0.10	0	0.00	3.36	0.09	49.21	0.61	61.61	0.55	41.64	0.74	59.80	0.40
20	Kristinachnec	9	0.80	2.6	0.25	4.32	0.13	74.06	0.93	35.02	0.94	43.6	0.78	73.61	0.60
21	Lahachok	6	0.50	1	0.10	2.99	0.08	62.68	0.78	47.52	0.76	47.27	0.84	97.23	0.96
22	Lamachaur	7.5	0.65	0.8	0.08	1.91	0.04	72.22	0.91	35.87	0.93	55.97	1.00	43.21	0.15
23	Lumle	6.5	0.55	10.3	1.00	0.69	0.00	58.81	0.73	46.12	0.78	46.19	0.83	92.06	0.88
24	Lwangghalel	3.5	0.25	1.1	0.11	6.49	0.21	53.06	0.66	58.43	0.59	40.63	0.73	94.09	0.91
25	Machhapuchre	1	0.00	0.6	0.06	28.86	1.00	60.72	0.76	51.67	0.69	42.6	0.76	93.18	0.90
26	Majhthatna	3	0.20	0.9	0.09	4.46	0.13	71.52	0.90	37.96	0.90	49.78	0.89	41.26	0.12
27	Mauja	6	0.50	0.6	0.06	4	0.12	55.43	0.69	59.57	0.58	34.87	0.62	58.49	0.38
28	Mijuredanda	7	0.60	1.7	0.17	5.85	0.18	38.67	0.47	67.78	0.45	43.49	0.78	66.90	0.50
29	Namarjung	8.2	0.72	2.3	0.22	8.86	0.29	36.67	0.44	68.25	0.45	54.21	0.97	70.06	0.55
30	Nirmalpokhari	7	0.60	1.4	0.14	6.73	0.21	67.42	0.85	43.99	0.81	46.3	0.83	33.33	0.00
31	Parche	1	0.00	0.3	0.03	8.25	0.27	59.53	0.74	66.97	0.46	41.04	0.73	75.16	0.63
32	Pumdi	6.5	0.55	0.9	0.09	7.52	0.24	68.51	0.86	44.6	0.80	47	0.84	83.04	0.75
33	Puranchaur	7	0.60	2.8	0.27	3.6	0.10	71.33	0.90	38.07	0.90	47.43	0.85	91.33	0.87
34	Rivan	1	0.00	0	0.00	3.04	0.08	55.8	0.69	60.11	0.57	43.96	0.79	56.10	0.34
35	Rupakot	5	0.40	0	0.00	6.08	0.19	62.52	0.78	51.57	0.70	41.27	0.74	55.18	0.33
36	Saimarang	2	0.10	0	0.00	4.68	0.14	58.03	0.72	51.02	0.70	46.27	0.83	94.98	0.92
37	Salyan	8.5	0.75	1.8	0.17	3.27	0.09	63	0.79	47.85	0.75	49.87	0.89	67.47	0.51
38	Sarangkot	7	0.60	3.7	0.36	2.68	0.07	65.1	0.81	46.91	0.77	49	0.88	90.94	0.86
39	Sardikhola	6.5	0.55	3.5	0.34	5.43	0.17	63.81	0.80	50.84	0.71	44.33	0.79	98.82	0.98
40	Siddha	3.5	0.25	0.4	0.04	2.38	0.06	21.34	0.24	82.7	0.23	44.84	0.80	45.00	0.18
41	Sildujure	1	0.00	0.4	0.04	3.93	0.12	51.48	0.64	61.26	0.55	40.16	0.72	82.90	0.74
42	Thumakotdan	6.5	0.55	1.7	0.17	4.13	0.12	65.29	0.82	46.61	0.77	44.6	0.80	88.65	0.83
43	Thumki	11	1.00	0	0.00	7.19	0.23	2.65	0.00	97.87	0.00	0	0.00	83.89	0.76

Source: Raw Data and Computation

* Out of 15 indicators taken in this sector, 7 are in this table and other 8 are in the following page. Composite index is the average of all 15 indicators.

Aggregate Development Sector (Contd.)

Table 10.7 Indicator Value and TV, computed Using 0 to 1 Scoring Transformation

S. no	VDC	Irrigated area		Electricity benef		Road Dist.		Road Dnsty		Bank		Cooperative		Agri-center		Rural Pop. Dnsty		CI_6
		%	TV (X_{13})	%	TV (X_{14})	Hrs	TV (Y_{15})	Km/KM 2	TV (X_{16}	per 1000	TV (X_{17}	per 1000	TV (X_{18})	per 1000	TV (X_{19}	per/Km2	TV (X_{24}	
1	Arbabijaya	5.98	0.04	55.71	0.56	1	0.80	0.7	0.25	0	0.00	0	0.00	0	0.00	238	0.41	0.33
2	Armala	63.49	0.52	49.93	0.50	0	1.00	0.1	0.04	0	0.00	0.5	0.32	0	0.00	167	0.29	0.47
3	Bhachok	35.44	0.29	0.00	0.00	1	0.80	0	0.00	0	0.00	0	0.00	0	0.00	81	0.13	0.33
4	Bhadaureta	18.57	0.14	1.91	0.02	3	0.40	0.9	0.35	0.1	0.33	0	0.00	0	0.00	292	0.51	0.34
5	Bhalam	61.86	0.51	50.27	0.50	1	0.80	0.3	0.12	0.1	0.60	0.3	0.21	0.1	1.00	304	0.53	0.57
6	Bharatpokh	52.83	0.43	52.17	0.52	1	0.80	0	0.02	0	0.00	0.2	0.13	0	0.00	262	0.46	0.40
7	Chapakot	46.06	0.38	89.28	0.89	3	0.40	0	0.00	0.1	0.33	0	0.00	0	0.00	71	0.12	0.39
8	Dangsing	4.88	0.03	0.00	0.00	4	0.20	0	0.00	0	0.00	0	0.00	0	0.00	36	0.06	0.27
9	Deurali	38.43	0.31	0.00	0.00	1	0.80	0	0.00	0.2	1.00	0	0.00	0	0.00	185	0.32	0.44
10	Dhampus	46.17	0.38	38.13	0.38	3	0.40	0.4	0.13	0.1	0.33	0.3	0.22	0.1	0.56	164	0.28	0.46
11	Dhikurpok	55.51	0.46	37.79	0.38	0	1.00	2.6	1.00	0.1	0.33	0.5	0.31	0.1	0.56	267	0.47	0.51
12	Dhital	23.69	0.19	0.00	0.00	3	0.40	0.3	0.11	0.1	0.33	0	0.00	0.1	0.56	236	0.41	0.38
13	Ghachok	64.51	0.53	49.85	0.50	2.5	0.50	1	0.38	0.1	0.87	0.4	0.24	0.1	0.67	439	0.77	0.54
14	Ghandruk	120	1.00	5.02	0.05	5	0.00	0	0.00	0	0.00	0	0.00	0	0.00	19	0.02	0.26
15	Hansapur	77.9	0.64	4.85	0.05	1	0.80	0.2	0.06	0	0.00	1.3	0.81	0	0.00	131	0.22	0.31
16	Hemja	64.56	0.53	72.79	0.73	1	0.80	0.8	0.32	0.1	0.87	0.4	0.25	0.1	0.67	569	1.00	0.60
17	Kahu	8.27	0.06	100.0	1.00	1	0.80	0.3	0.13	0.1	0.60	0	0.00	0.1	1.00	342	0.60	0.58
18	kalika	49.58	0.41	48.46	0.48	0	1.00	0.6	0.22	0	0.00	0	0.00	0	0.00	194	0.34	0.40
19	Kaskikot	47.56	0.39	48.98	0.49	0	1.00	0	0.00	0.1	0.33	0.4	0.22	0	0.00	214	0.37	0.35
20	Kristinachn	42.19	0.34	26.43	0.26	2	0.60	0.4	0.14	0.1	0.40	0	0.00	0	0.00	238	0.41	0.44
21	Lahachok	85.71	0.71	13.27	0.13	2	0.60	1.2	0.45	0.1	0.87	0.2	0.15	0.1	0.67	360	0.63	0.55
22	Lamachaur	65.99	0.54	85.93	0.86	0	1.00	0.1	0.04	0.1	0.60	1.6	1.00	0.1	1.00	482	0.85	0.64
23	Lumle	1.49	0.00	0.00	0.00	0	1.00	0.8	0.29	0	0.00	0	0.00	0	0.00	17	0.02	0.40
24	Lwangghal	108.5	0.90	0.00	0.00	4	0.20	0	0.00	0.1	0.33	0	0.00	0.1	0.56	37	0.06	0.37
25	Machhapuc	77.34	0.64	0.00	0.00	3	0.40	0	0.01	0	0.00	0	0.00	0	0.00	6	0.00	0.35
26	Majhthatna	52.77	0.43	0.00	0.00	0	1.00	0.3	0.13	0	0.00	0	0.00	0	0.00	295	0.51	0.35
27	Mauja	56.98	0.47	13.38	0.13	2	0.60	0	0.00	0.1	0.60	0	0.00	0.1	1.00	212	0.37	0.41
28	Mijuredand	85.47	0.71	0.00	0.00	3	0.40	0	0.00	0	0.00	0	0.00	0	0.00	116	0.20	0.30
29	Namarjung	70.97	0.59	0.00	0.00	3	0.40	0	0.00	0	0.00	0	0.00	0.1	0.78	5.2	0.00	0.36
30	Nirmalpok	46.63	0.38	66.21	0.66	1	0.80	0.2	0.08	0.1	0.40	0	0.00	0	0.00	377	0.66	0.43
31	Parche	90.81	0.75	28.50	0.29	4	0.20	0	0.00	0	0.00	0	0.00	0.1	0.78	50	0.08	0.33
32	Pumdi	40.84	0.33	27.28	0.27	0	1.00	0	0.00	0.1	0.40	0.9	0.56	0	0.00	297	0.52	0.48
33	Puranchaur	85.68	0.71	0.00	0.00	1	0.80	0.3	0.10	0	0.00	1	0.62	0	0.00	162	0.28	0.47
34	Rivan	49.43	0.40	0.00	0.00	3	0.40	0.1	0.05	0.1	0.87	0	0.00	0.1	0.67	116	0.20	0.34
35	Rupakot	36.95	0.30	5.95	0.06	1	0.80	0.2	0.06	0.2	1.00	0	0.00	0	0.00	236	0.41	0.38
36	Saimarang	24.48	0.19	0.00	0.00	1	0.80	0	0.00	0	0.00	0	0.00	0	0.00	134	0.23	0.31
37	Salyan	14.75	0.11	0.00	0.00	3	0.40	2.5	0.93	0	0.00	0.3	0.16	0	0.00	242	0.42	0.40
38	Sarangkot	41.05	0.33	58.00	0.58	0	1.00	0.3	0.11	0.1	0.33	0.2	0.11	0	0.00	352	0.62	0.50
39	Sardikhola	75.53	0.62	0.00	0.00	2	0.60	0.1	0.05	0	0.00	0	0.00	0	0.00	63	0.10	0.38
40	Siddha	76.55	0.63	0.00	0.00	3	0.40	0	0.00	0.2	1.00	0	0.00	0	0.00	156	0.27	0.27
41	Sildujure	68.08	0.56	0.00	0.00	1.5	0.70	0	0.00	0	0.00	0	0.00	0.1	0.78	104	0.18	0.33
42	Thumakotd	94.2	0.78	0.00	0.00	3	0.40	0.1	0.04	0	0.00	0.2	0.14	0.1	0.78	110	0.19	0.43
43	Thumki	64.64	0.53	0.00	0.00	1	0.80	0	0.00	0.2	1.00	0	0.00	0	0.00	115	0.19	0.30

Source: Raw Data and Computation

Note Yi inversely related to Wellbeing = (MAX (Yi) -Yi)/(MAX (Yi) - MIN(Yi)
Xi directly related to Wellbeing = (Xi-MIN(Xi))/(MAX(Xi)-MIN(Xi)

Appendix 11
Map Digitization and Printing

This section describes about the process of digitization of map and printing of the map ArcView. This part is an addendum of the methodology, chapter 3 and supplemented the clarity of the process if any one likes to see. The GIS technique is common in r and regional planning field and it is common among the professionals of the fi Considering this fact it is describe under this section.

1. Digitization and Mapping in ArcView

The following flow diagram shows the method applied in digitizing map and storing da in ArcView.

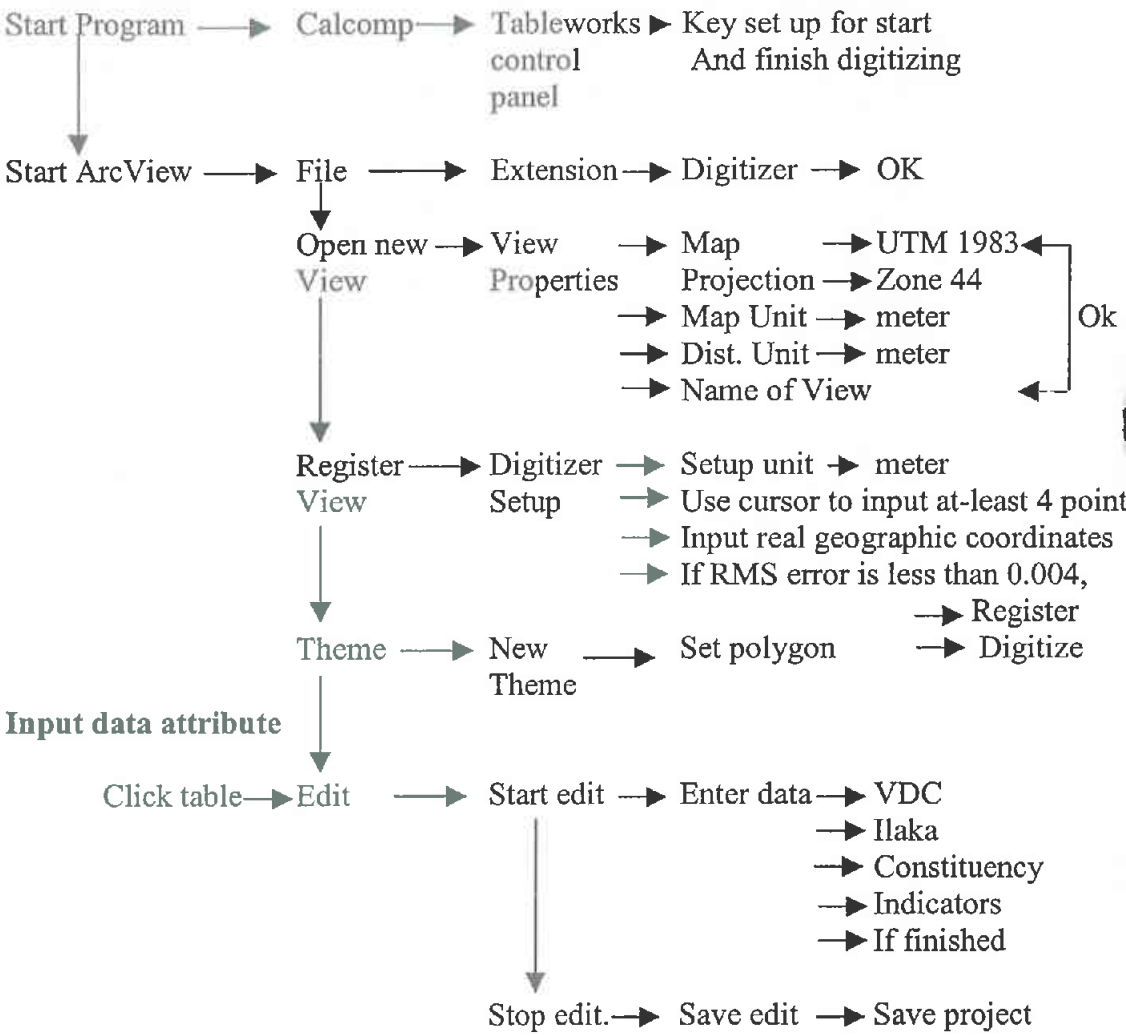

Figure 2.1 Flow Diagram for Map Digitization and Data Entry in ArcView

2.2 Preparing Map and Printing

Map preparation is done after the data entry. Once the data entry is completed, ArcVi can be easily run to prepare map. Figure 3.3 shows the process of preparing map in

ArcView.

- Run ArcView and open existing project.
- Then open a new view. Add theme from the tool bar or from theme menu.
- Give view name from the view properties. Fix map projection. Click ok.
- Give theme name from theme menu and properties.

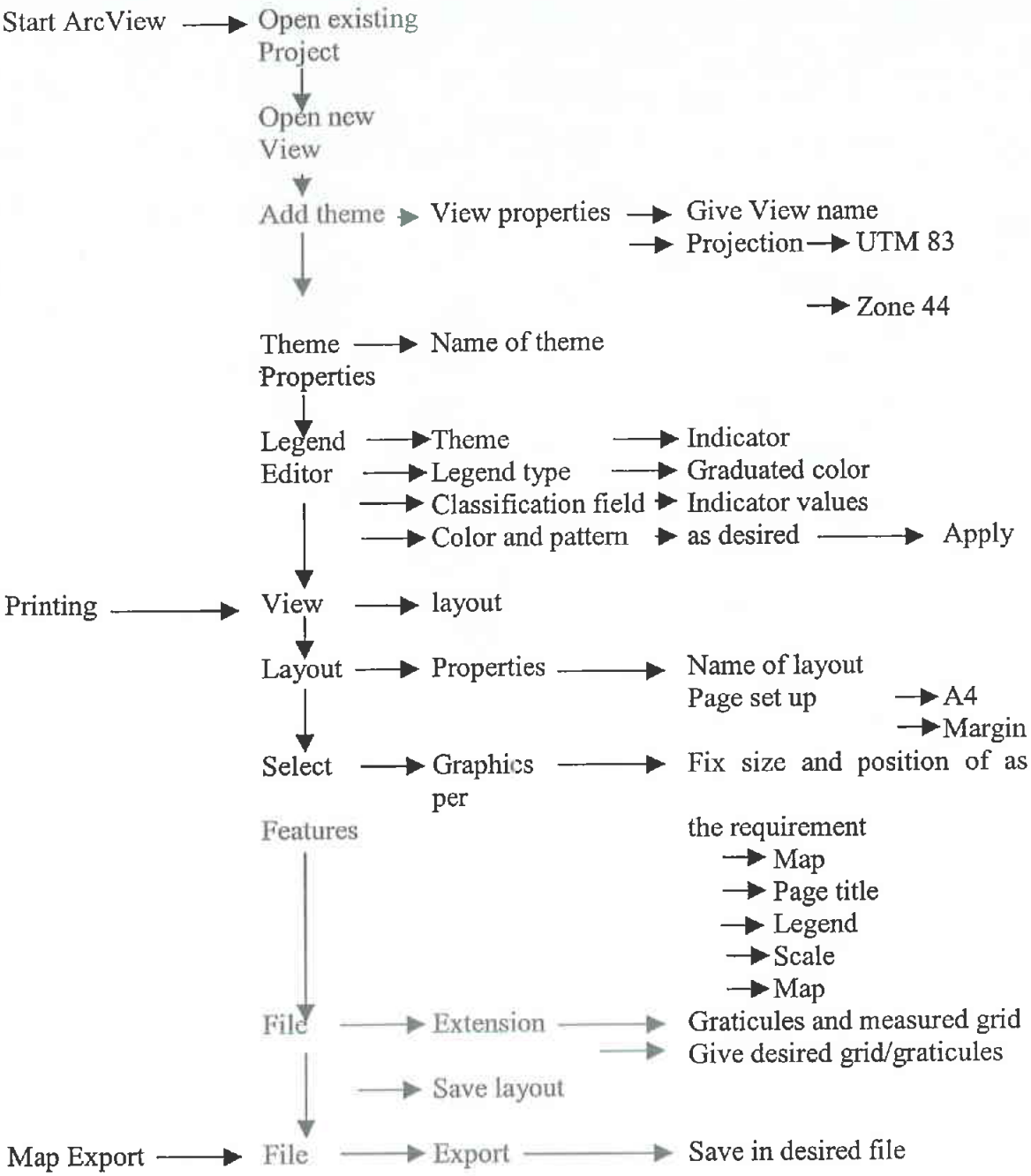

Figure 2.2 Flow Diagram for Map Preparation and Map Export

- Click double the left mouse and legend editor appears. The class interval, legend type, and color and texture patterns are fixed. Then click the apply icon. The legend editor is saved in .avl extension and can be loaded again if the pattern is changed.

- For printing prepared map, the view is to be taken in layout. In layout, from la properties, layout name is written.
- From the layout properties page setup and margin is fixed.
- Select the item and go to graphics and fix size and position of legend, scale, map, page, north line etc.
- Click file and click export to export the prepared map in the desired file.

Appendix 12

The following table presents the work plan to be followed during the research period. Basically, there are three phases, first, preparation of proposal and defending of proposal to carry out the field work, second, the field work and finally, the analysis followed by report preparation. First phase takes two months, December and January, second phase takes two months, February to March and third phase takes remaining four months up to July.

Table 12 Work Plan Followed During Research Period

S.no	Activity\Month	Dec '00	Jan 91	Feb	Mar	Apr	May	June	July	Aug	Remarks
1	Formulating Research Proposal										
2	Defense and Budget Approval										24 Feb
3	Field Work (Data collection)										27 to Field
3.1	Preparation in Kathmandu										2nd Apr. back to AIT
3.2	Kaski DDC and Other office										
3.3	Kathmandu final review										
4	Data Processing and Analysis in AIT										
5	First Draft Thesis Preparation										
6	Thesis Progress review										4th july
7	Final Draft Thesis										
8	Final Thesis Defense										30 July

Source: Prepared for Field Visit