Chapter 2

REVIEW OF RELEVANT WORKS AND FORMULATION OF RESEARCH METHODOLOGY

2.1 Review of Relevant Works

Review of relevant literatures is a very essential step to develop ideas as well as analytical framework for research. It provides knowledge and concepts required to address the issues systematically from right perspective. The following is an attempt to review some of the theoretical and empirical works relevant to the present research problem.

2.1.1 Review of the Theoretical Approaches

"Geography has a permanent identity crisis because what geographers do is complex" - this remark made by Peet (1998) conveys the inherent complexity in the disciplinary viewpoint which the geographers need to exercise in understanding a complex set of interrelationships among different phenomena. Geography is basically the study of the relation between society and environment. The discipline looks at how society shapes, alters and increasingly transforms the natural environment, creating humanized forms until a complex natural-social landscape results (Peet, 1998). Thus the relation between society and nature is a complex of interactions which call for abstraction and theorization. There are several types/levels of generalization – metaphilosophy, philosophy, theory and practices - all are divorced from real geographical phenomena and material practices by mental processes of simplification, generalization and essentialization (Peet, 1998). Metaphilosophy is the link between world views and cultures as well as thinking organized around philosophical concern. Thus
metaphilosophy refers to attempt at thinking the fundamentals of existence: the presence of god, the meaning of life, the truth of thought, the emancipation of humanity.

Philosophy is an abstract way of thinking and any practitioner of an academic discipline undertakes research within a framework provided by a philosophy of that discipline (Johnston, 1984). It involves the consideration of methods of reasoning and argument and, therefore, the philosophy of a discipline or group of disciplines, involves the study of the ways in which work is conducted within the disciplinary boundary. The central element of a philosophy is its theory of knowledge (epistemology) which provides answers to the fundamental questions such as *What can we know?* and *How can we know it?* According to Johnston, four aspects of knowledge are covered by epistemology: its nature — what it is that one believes; its type — such as knowledge by acquaintance and knowledge by description (i.e. first-hand and second-hand knowledge); its objects — the facts that are the subject matter of knowledge; its origins. Ontology, which is the theory of existence or what can be known, associates with epistemology in the philosophical framework. Therefore, every disciplinary philosophy contains a framework of both an epistemology and ontology together with methodology indicating rules and procedures of how information can be collected and organized. No research takes place in a philosophical vacuum. Harvey (1969) emphasized that geography must take both methodology and philosophy into account and concluded that methodology without philosophy is meaningless.

There are a number of philosophies suggested over the centuries that can be categorized as follows:

1. Empiricist approach: Its epistemology is that we know through experience and ontology is that the things we experience are the things that exist. The methodology for this approach simply requires a presentation of the experienced facts. Most disciplines have originated with empiricist practices, which prevailed during the late nineteenth and early twentieth centuries and human geography was no exception. It was based on collection
and organization of materials about places and was widely used in the development of
two schools of thought (environmental determinism and possibilism) relating to physical
environment and human activities on the earth’s surface. The presentation of two sets of
information through empiricism helped to continue a debate on the supremacy of one on
the other till 1960s when the theoretical and quantitative revolution influenced the
philosophy and methodology of the subject subsequently.

2. Positivist approach: It is based on the epistemology that knowledge is gained through
experience, which requires that the experience be firmly established as verifiable
evidence on which all will agree. Its ontology is thus one of agreed evidence and its
methodology is one of verifying factual statements by what is often known as ‘scientific
method’. Therefore positivist approach is involved with the making of empirical
generalization, statements of law-like character which relate to phenomena that can be
empirically recognized (Johnston, 1984). Social philosopher August Comte, the
proponent of positivism, believed that the scientific methods could be applied to the social
phenomena; it can be the basis for predictions and realization of causal variables. After
Second World War, there was much influence of the positivist concept of science in
human geography. The quantitative revolution provided statistical tools and techniques to
verify the fact as well as testing of hypothesis strengthening thereby the concept. As a
result even today, certain aspects of the approach are emphasized as mandatory steps
for research such as measurement, data collection and statistical testing of hypothesis.
All the important theories (central place theory, land use theory, industrial location theory,
urban social theory and spatial interaction theory) developed in the discipline are inclined
to the positivist approaches.

3. Humanistic approach: Its epistemology is that knowledge is obtained subjectively in a
world of meaning created by individuals and its ontology is that what exists is that which
people perceive to exist. Its methodology involves the investigation of these individual
worlds and it emphasizes individuality and subjectivity rather than the replicability and
truth (Johnston, 1984). The basic feature of humanistic approach is its focus on man as a thinking being and its aim is not to increase predictive and explanatory power but to improve understanding. Idealism, behaviouralism, phenomenology as well as existentialism are some of the common approaches in the line of humanistic thinking.

4. Structuralist approach: The epistemology of this approach on the other hand is that the world of appearance does not necessarily reveal the world of mechanisms. Its ontology states that what really exists (i.e. the forces creating the world, or the structures) cannot be observed directly but only through thought, while its methodology involves the construction of theories which can account for what is observed but which can not be tested for their veracity because direct evidence of their existence is not available (Johnston, 1984). Marxism, radicalism and realism are some of the important approaches within the broad philosophical domain of structuralism.

Most of the researches undertaken by human geographers at present seem to follow three main approaches - positivism, humanism and structuralism. Although approaches like postmodernism, post-structuralism and feminism are also being adopted by some geographers, these are yet to gain wide acceptance because of absence of well-defined epistemologies. There is therefore debate as well as conflicts among human geographers in adopting the most relevant philosophy in their research. Some of the followers of a particular approach are prepared to accept certain elements of other approaches, while most have remained from firmly aligned to a single approach only. Johnston (1996) questions whether the approaches they represent be accommodated in a single or pluralistic approach in human geography, or must they remain in the possession of separate, irreconcilable approaches?

Positivism is much harder to integrate with the others, because of its emphasis on objectivity and empirical generalizations. The focus of positivism and humanism can however be amalgamated as per the nature of the study. Johnston mediates the negotiation by arguing that although individuals are not relevant in the process of
unfolding the general pattern, the use of quantitative approaches in manipulating data, and humanistic approaches in understanding relevant decisions may be justified. In the same way, human geographers interested in the study of the details of space and place may operate within the frame of a theoretical structure and may use elements of other approaches to achieve the links.

In the background stated above, the present study attempts to take advantages of all the three approaches: positivism to generalize the phenomena, humanism to analyze the individual decisions and structuralism to understand the structure, process and pattern of phenomena operating in the area.

2.1.2 Review of Previous Works

Since the early times geographers and scholars from other disciplines as well, have been trying to analyze the interrelationships between society and nature, not necessarily from the livelihood perspective. However, the concept of livelihood as a separate frame of reference is the development of the mid-1990s and much credit goes to Chambers who popularized the approach among academicians, researchers as well as development agencies. The emphasis made on sustainability in the Brundtland report elevated the sustainable livelihood concept to the position of unquestioned virtue. The popularity that it has gained stimulated academicians as well as researchers to pursue research in this line. As a result, now-a-days it is not uncommon to see research activities on different aspects of livelihoods and sustainability undertaken by academicians of different backgrounds. An attempt has been made in the following sections to review relevant literatures on livelihood pattern, adaptive strategy and sustainability indicators.
Works Relating to Livelihood Strategy

Chambers (1988) in the discussion paper entitled Sustainable Livelihoods, Environment and Development: Putting Poor Rural People First advocated to address the wants and needs of the very poor and poor rural people for sustainability. According to Chambers only secured and adequate livelihoods allow and encourage the poor people for the long-term view of resource use and to maintain and improve their condition. Chambers even criticized the Population, Resources, Environment and Development (PRED) paradigm and the Brundtland Commission for failing to start with the poorer section and put their priorities first. According to him, none of the 24 items of the standard agenda of the commission started with the poor – for example, the pastoralists, female headed households, the landless, those who rely on common property resources, forest-dwellers, marginal and small farmers.

Chambers outlined the modes of thinking of normal professionals concerning environment, development, and poor people. He argues that Environment Thinking (ET) and Development Thinking (DT) are forms of first thinking manifestation of normal professionalism which failed due to not incorporating the target group (poor people). Therefore, attempts were made to reconcile ET and DT in terms of Livelihood Thinking (LT) by the Brundtland Commission moving closer to the poor people as the starting point of reference although it did not take further step of seeing things from poor people's point of view. Chambers argues for Sustainable Livelihood Thinking (SLT) that takes sustainability from ET, linking with the need of the poor for long-term security for themselves and their children; productivity from DT, linking it with the needs of the poor for more food and incomes; and primacy of poor people’s livelihoods from LT. Therefore, it is the sustainable livelihood with secure rights and ownership which can integrate what poor people want and need, with those concerned with population, resources, environment and rural development.
Chambers focuses on some common elements as well as policies which contribute to sustainable livelihood security such as peace, law and order; assurance of basic food and cash needs round the year; a net positive asset position with means to meet contingencies without becoming indebted; secure rights of ownership and use of assets, including sale and inheritance and absence of administrative restrictions and hassle. With the above policies in mind, and the priority of enabling the very poor to become poor, and of enabling the poor to avoid becoming very poor, he recommends measures to achieve SL as: redistribution of land to the landless; transforming small-scale tenancy and sharecropping into inheritable rights to land; allocating degraded forest land to poor households for growing trees, and for growing crops and grazing animals where appropriate; preserving access by the poor to common property resources, or ensuring that they are the main beneficiaries of privatization; managing commons for higher productivity; reinforcing livelihood strategies by supporting diversification, including non-agricultural activities; good prices for the crops and animals of small and marginal farmers; maintaining prices for whatever poor people sell (jewelry, livestock, wood, charcoal, honey, fish, etc.) in bad years or at difficult times of a year; year round irrigation which generates work and removing administrative restrictions on freedom to dispose of assets, such as cutting trees on private land and selling them.

The concept of sustainable livelihood was put forward in the report of Advisory Panel of the World Commission on Environment and Development (WCED, 1987) and was made central to its report. It defined livelihood as adequate stocks and flow of food and cash to meet basic needs. Similarly the panel refers livelihood security to secure ownership of, or access to resources and income earning activities. WCED considered sustainable livelihood as an integrating concept and viewed sustainable livelihood security as the precondition for a stable human population, a prerequisite for good husbandry and sustainable management, and a means of reversing or restraining destabilizing processes, especially rural to urban migration. Sustainable livelihoods were
seen as a means of serving the objectives of both equity and sustainability.

The theme of the discussion paper by Chambers and Conway (1991) entitled *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century* was to provoke discussion by defining, exploring and elaborating the concept of sustainable livelihoods. Modifying the WCED panel definition, the authors proposed a new working definition of sustainable livelihoods which became more popular in this field. According to them, a livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term.

Chambers and Conway visualized capabilities as both an end and means of livelihood: a livelihood provides the support for the enhancement and exercise of capabilities (at end); and capabilities (a means) enable a livelihood to be gained. The authors used the idea of capability as has been used by Amartya Sen to refer to being able to perform certain basic functions, to what a person is capable of doing. It includes, for example, to be adequately nourished, to be comfortably clothed, to avoid escapable morbidity and preventable mortality, to lead a life without shame, to be able to visit and entertain one's friends, to keep track of what is going on and what others are talking about. Therefore, within the generality of Sen's use of capability, there was a subset of livelihood capabilities that include being able to cope with stress and shocks, and being able to find and make use of livelihood opportunities.

Chambers and Conway used the term assets to include all the available resources as well as stores (tangible) and claims together with access (intangible) which provide materials and social means that a person or household can use towards a livelihood. Stores are the food stocks, gold, jewelry and woven textiles, and cash savings in banks of
thrift and credit schemes. Resources include land, water, trees, and livestock; and farm equipments, tools, and domestic utensils. Claims are demands and appeals which can be made for material, moral or other practical support or access in many forms such as food, implements, loans, gifts, or work. The claims can be made at times of stress and shock to individuals or agencies, relatives, neighbors, patrons, chiefs, social groups or communities, or NGOs, government or the international community, including programs for drought relief, or poverty alleviation. Similarly, the term access denotes the opportunity in practice to use a resource, store or service (transport, education, health, shops and market) or to obtain information (extension services, radio, television and newspapers), material, technology (techniques of cultivation, new farm tools, and new seeds), employment (rights to common property resources: fuel wood or grazing on state or communal lands etc.), food or income.

In reality, rural livelihoods comprise one, or more often several activities. Activities are all sorts of livelihood strategies and/or “range of combination of strategies and choices that people make/undertake in order to achieve their livelihood goals with available assets as well as existing capabilities”. Furthermore, many livelihood activities of different parts of the globe are determined by even accident of birth. It is not uncommon in many parts of rural India as well as Nepal to have births of children into a caste with assigned role as farmers, porters, shepherds, goldsmith/blacksmith or washer as detrimental factor for continuity of livelihood activities.

Chambers and Conway criticized conventional professional concepts and methods such as Production thinking (tones of steel or tones of food grains), Employment thinking (numbers employed in jobs) and Poverty-line thinking (earnings or wages per year) as the measurement of development and quality of livelihoods. These concepts and measures, generated in urban conditions and for professional convenience, do not fit or capture the complex and diverse realities of most rural life.
With the perspective of the 21st century and beyond, Chambers and Conway suggested policy implications for the richer as well as for the poorer section. They advocated that the richer section should change life styles to make lower demands on the environment and should be left more for the poor and for future generations. However for the rural poorer, there should be urgent policy implementation with provision of enhancing capability (education for livelihood-linked capability; health, both preventive and curative to prevent permanent disability; bigger baskets of choices for agriculture and support for farmer's experience; transport, communications and information services for rights, market prices and skills; and flexible credit cards for new small enterprises), improving equity (redistribution of assets, especially land and, land to tillers; secure rights to land, water, trees and other resources; protection and management of common property resources and equitable rights of access for the poorer; enhancing the intensity and productivity of resource use and exploiting small scale economic synergy, rights and effective access to services, especially education, health and credit and removing restrictions which impoverish and weaken poor) and increasing social suitability (peace and equitable law and order; disaster prevention; prompt support in bad years and high prices; conditions for lower fertility, treatment in accidents etc.).

Chambers (1995) in the discussion paper entitled Poverty and Livelihoods: Whose Reality Counts? advocates that the realities of poor people are local, complex, diverse and dynamic. Income poverty, though important, is only one aspect of deprivation. Apart from poverty, many dimensions and criteria of disadvantage, ill-being and well-being as people experience, social inferiority, isolation, physical weakness, vulnerability, seasonal deprivation, powerlessness and humiliation are also important in the cases of poor people. The author therefore strongly argues for sustainable livelihoods as an objective to address the poverty of the poor and stresses on redistribution of livelihood resources, proper prices and payments, health abolishing restrictions and hassles and safety nets for poor people at bad times which can contribute in diminishing the poverty through
diversified livelihoods as well as enhancement of sustainability.

Chambers strongly criticizes the measurement scales adopted by present conservative west bound (thinking developed in the context of more industrial and urban conditions) professionals about the poor, economist dominated poverty thinking concerned with income poverty/consumption poverty and employment thinking concerned with jobs. He firmly states that these are not always capable for measuring of quality of life and standard of living. Therefore, Chambers suggests for rethinking of existing measurements scales and knowledge on poverty and advices the new professionals to put people before things, and poor people and their priorities first of all.

Twyman (2000) in the article on Natural Resources use and Livelihoods in Botswana's Wildlife Management Areas shares the experiences on the needs of a deeper understanding of people's relationship with environment before planning for and implementing any program. He found the participatory approach a suitable method to carry out study in a newly established wildlife park of western Botswana. For conservation of biodiversity as well as maintenance of livelihoods of local people the park management integrated traditional indigenous knowledge of local individuals (gathering of wild foods as well as livestock) within the wildlife management areas.

Department for International Development (DFID, 2001) made a valuable contribution by developing principles, framework as well as methods for livelihood studies. DFID emphasized on the following six principles to pursue sustainable livelihood studies. These are:

1. People at the center of development, rather than the resources they use or the governments that serve them.

2. Adoption of holistic view which attempts to gain a realistic understanding of what shapes people's livelihoods and how the various influencing factors can be adjusted so that, taken together, they produce more beneficial livelihood outcomes.
3. It emphasizes on dynamic nature of livelihoods: it seeks to understand and learn from change so that it can support positive patterns of change and help mitigate negative patterns.

4. Focus of the approach towards strength and opportunities, rather than problems and needs.

5. Emphasis on macro-micro link policies and institutions to the livelihood options of communities as well as individuals.

6. Key approach concerns livelihood with sustainability.

DFID developed a sustainable livelihoods framework in order to understand and analyse the livelihoods. The framework provides a checklist of important issues and sketches the link among each other; draws attention to the processes; and emphasizes the multiple interactions between the factors that affect livelihoods. The people-centered analysis begins with simultaneous investigation of people's assets (human, natural, financial, social, physical capitals as well as influence and access), through the livelihood strategies to achieve the objectives (the livelihood outcomes). DFID emphasized on feedbacks that are likely between: transforming structures and processes and the vulnerability context; and livelihood outcomes and livelihood assets.

DFID emphasized on quantitative and qualitative data collection techniques for the analysis of sustainable livelihoods at local level. To fulfill the purposes it insisted for key informants interview, focus group discussion, household surveys, resource assessment as well as participation in the fields.

Mukherjee (2002) in the book *Alternative Perspectives on Livelihoods, Agriculture and Air Pollution* evaluated the impact of air pollution on health, quality of life and the effectiveness of the existing support network available to farmers of urban and peri-urban areas of Haryana and Uttar Pradesh, India. It has approached the problem of air pollution in a holistic manner from the perspectives of local communities. The impact of air
pollution on agriculture was viewed as part of a whole livelihood system. The study found that agriculture in urban and peri-urban areas of Faridabad in Haryana and Varanasi in Uttar Pradesh had an important role not only as a source of livelihood but also in supplying food grains, vegetables, pulses, milk, fruits and other agricultural produce to urban and peri-urban communities and markets. Based on Participatory Rapid Rural Appraisal (PRRA), the study highlighted the pivotal role of agriculture on societal and cultural issues like gender, health and food security.

Works on Livelihood Strategy in Nepal

The concept of livelihood is very new in the context of Nepal and as a result there are very few works on the issue. Even the available studies suggest that most of the works were carried out with respect to community and occupational caste groups (Timilsina, 2003). Bishop Berry could be credited as the first scholar to initiate the study of livelihood issue in areas of Karnali region, high mountain ecological belts of Nepal.

Bishop (1990) in the book Kamali under Stress: Livelihood Strategies and Seasonal Rhythms in a Changing Nepal Himalaya described the difficulties of the inhabitants of Karnali areas. Located in the northern part of Himalayas with difficult terrain, the region is further characterized by inaccessibility in terms of road networks. As such livelihood strategies are very difficult to pursue. Livestock ranching is the most important activity characterized by seasonal movement to higher elevation areas in summer and to lower areas in winter. Due to lower temperature in long winter season agricultural activities require long growing season. Lack of diversification of livelihood activities in the area guided the author to urge for more activities to strengthen the livelihoods of the people enable them to get rid of stress.

The study by Cecilla (1998) emphasized on the issues of accessibility to strengthen the livelihoods of the rural agrarian communities particularly in the context of
the hilly areas as that of Nepal. The study found proximity to the urban markets to be the important factor in maximizing benefit from agrarian products. Therefore, Cecilia advocated for the reinforcement of the physical infrastructure connecting rural and urban areas to intensify local interaction and movement of resources. The author is in favor of developing linkages with more than one urban centre which is likely to be more successful for rural development as it increases the ranges of income diversification opportunities and development of potential market centers. The study envisaged the role of migration to be useful in enhancing the livelihood strategies of the rural people. The study of Timilsina (2003) confirmed a positive effect of newly constructed roads on the livelihood strategies of the rural people. According to him, the most noteworthy aspect of change is the development of rural small market centers and expansion of market functions that result in diversification of livelihoods of the people around.

Papola (1999), in analyzing Himalayan people’s livelihood and adjustments, found food crop based subsistence agriculture and dependence on local natural resources as a major strategy. However, the author also noticed the importance of remittances from temporary and seasonal out-migration as well as off-season framing as the other livelihood supportive alternatives to fulfill the limited needs of the Himalayan people.

The development agencies such as GTZ (Kievelitz, 1999) and FAO (2002) focused on the development of strategic guidelines for sustainable ecological development within the Himalayas by improving livelihoods of the rural inhabitants. In this connection, Kievelitz approved for three pillars of sustainable ecological development: sustainable management of natural resources, sustainable development and strengthening of key institutions and sustainable increase in income levels of rural inhabitants. In the same way, FAO visualized the main sources of mountain livelihoods as farming, livestock and fisheries. Because of the limited marketing opportunities due to physical remoteness of the mountain areas, and unfavorable terms of trade, mountain economies are isolated from lowland prosperity creating difficulties to cope with hunger.
and poverty, the organization observed. Therefore, FAO urges for a need to identify and promote niches for mountain products and services such as specialized farm produce (large cardamom, agro-forestry and livestock), environment-and people-friendly models for hydroelectricity generation and tourism promotion as well as non-wood forest products and handicrafts. However, integration of mountain and lowland economies is a must together with the considerations of the economic, environmental and social costs of externally driven resource extraction in the mountains.

Bhurtel (2000), Dahal (2001), Subedi and Pandey (2002) carried out livelihood studies with respect to community and occupational caste groups in different parts of Nepal. The findings of Bhurtel show that the development of the market centers and the tendency of taking up of clay pot making as an alternative by the local people encouraged the young generation of Kumals to shift to other occupations from traditional pot-making at Pokhara Valley. The vulnerable group after the mounting threat to traditional occupation opted for the alternative of visiting some of the Gulf countries as foreign laborers. Similarly, the development of irrigation facilities and introduction of high yielding variety of seeds encouraged the community to shift from the traditional pot-making works to farming.

Interestingly, Dahal (2001) observed a change in livelihood practices of Baramus community of far western Nepal. The communities dependent on traditional Dole (Chariot bearer) and Bani (porter/wage labor) livelihoods suffered a severe threat in maintaining their livelihoods through the traditional system. The diminishing trend in the use of Dole in the marriages during the recent days and loss of Bani system forced the community to go for some newer livelihood alternatives. The opportunities provided by expanded markets and better accessibility together with alternative sources of income helped the Baramus community to seek jobs of the type of urban labor, wage worker etc in the emerging circumstances.
Subedi and Pandey (2002) observed significant variation in livelihood strategies even within the same ethnic group. The Rai community inhabiting two villages located in different ecological belts was taken by them as an example. Sitalpati, one of the two villages is characterized by multiple cropping and crop diversification strategy while Makalu by crop farming and livestock raising. The livelihood strategies followed by the villagers are characterized by a range of activities from farming to selling livestock and livestock products and working as wage laborer.

The study by Haffner (2003) concluded that despite severe ecological hazards inherent in high mountain environment, people of Mustang have successfully developed sustainable strategies to manage their traditional ways of life (*genre de vie*). The author appreciated the strategies of appropriate agricultural land use, habitation and house construction in harmony with the local environment. It is noteworthy that the people of southern Mustang, a remote and backward district of Nepal, have been able respond actively to the challenges of modern times and experienced a remarkable change concerning social, economic and political aspects of life. The most successful intervention is the introduction of apple and vegetable farming as well as livestock raising along with development of tourism after 1970’s. The agriculture generally performed in the area is the result of sustainable practices adopted by the indigenous people. Due to overuse of forests and pastures in the past, the problem of deforestation, anthropogenic slope denudation and soil erosion cropped up in the area. Interestingly the people have devised a special economic system of farming together with trade and seasonal migration to overcome the limits of the local economic potential and changing economic challenges.

**Works Relating to Adaptive Strategy**

Most of the existing literatures are found to cover livelihood and adaptive strategies together. As such, there are very few works specifically confined to the adaptive strategies of the rural people.
While evaluating the adaptive performances of the people in West Africa, Madge (1995) highlighted the flexibility of household livelihood strategies as the key feature of rural Gambian society. In analyzing the performances of rural Jola households, he identified a sequential coupling of parallel activities: farming with collecting (farm/forest), subsistence with commerce (production/reproduction) and wild trees with cultivated crops. Madge, therefore, advocated for the concept of adaptive performances in relation to intermeshed and cyclical nature of productive, consumptive and reproductive functions.

CIDA and SICI (1997) in a joint research work evaluated the adaptation of the people living in the rural areas of Kullu Valley of Himachal Pradesh, India. The findings suggest that adaptive strategies followed by households were not homogeneous across the village: different individuals, households and village groups adopted different strategies. Some strategies were viable for the majority of the households of a village, while others were restricted to families of higher socio-economic class or caste. The characteristics of coping strategies were of the crisis response type, while adaptive strategies were responses of longer term. The joint research identified eight types of strategies at individual as well as household levels; some of them were interrelated with meeting day to day household needs. These include diversifying the activities, maintaining crop biodiversity in the agricultural system, increasing market integration, reliance on agricultural wage labor and urban employment, building up of household inventories, relying on common property resources and forming community groups. However, communities do not have a single adaptive strategy to use when reacting to change and attempting to mitigate vulnerability; instead there are a number of strategies used by the people and thus constitute a bundle of options. Further, not all strategies are viable for each group within the village. Some strategies were for the entire village, while others were specific to gender, socio-economic status, age or caste.

Subedi (1993) in his doctoral thesis analyzed the growth of population, economic change and coping strategies of the rural communities in Ilam district of Nepal. He
observed two kinds of pressure namely, routine pressure and severe pressure in order to cope with the steady growth of population over the years. Routine pressure occurred in the process of maintaining as well as improving the socio-economic status of the households and reflected the seasonal fluctuation in the crop yield primarily due to monsoon failure. Similarly, the factors of severe pressure were natural calamities, chronic failure of the crops, illness and/or death of principal earning members, etc. The author outlined several adaptive strategies of the rural households to sustain and overcome pressures. Strategies to cope with routine pressures were reduction of the period of land under fallow, conversion of *bari* into *khet*, multiple cropping and crop diversification, market oriented production, introduction of chemical fertilizer and new crops. Similarly the strategies to cope with severe pressure were selling of the produce, cattle, poultry and any other domestic animals though they were not meant for sell; taking loan of cash and/or kind; wage work for cash and/or kind; mortgage/sell household assets, mortgage and sell of land and out-migration.

Subedi and Pandey (2002) observed adaptive strategies of the Rai community in two villages of different elevation levels. Households from both Sitalpati and Makalu villages were adopting the strategy of conversion of land under *Khorias* (shrifting agriculture) to *Bari* (non- irrigated sloping terrace) and ultimately to *Khetland* (irrigated sloping terrace). This process generated additional inputs in agriculture. Adoption of multiple cropping and crop diversification together with working as wage laborer, borrowing, crediting and livestock selling were sequences of livelihoods opted under pressure. The major findings of the study are the specific sequence of change in land use pattern and conversion of land into more productive categories by the communities as adaptive strategies.
Sustainability Indicators: a crucial aspect of sustainability evaluation

According to Chambers and Conway (1991), there are two facets of sustainability for evaluation: first, whether a livelihood is sustainable environmentally with maintenance and enhancement of natural resource base and the second, whether a livelihood is sustainable socio-economically, which means the ability to cope with stress and shocks, and to continue and improve. Apart from these two facets, the authors also advocated for a practical analysis of sustainable livelihoods with a focus on valuing future generation’s livelihoods.

Hardi and Laszlo (1995) in their paper Models and Methods of Measuring Sustainable Development Performances argue in favor of Pressure – State – Response (PSR) framework in developing operational indicators with a linkage between actions, effects and reactions. The PSR framework considers -

1. the pressure that society puts on the environment (in the form of resource depletion and pollution);

2. the resulting state of the environment (especially the incurred changes) compared to desirable (sustainable) states and

3. the response by human activity, mainly in the form of political and societal decisions, measures and policies.

CIDA and SICI (1997) in a joint research project developed indicators of sustainability for villages of Gosal and Chachoga of Himachal Pradesh, India. Acknowledging the importance of biophysical, social, cultural and economic elements, the research team developed indicators from the literatures, observations of the human-environment system of the area as well as through interviews with people of the villages. The project identified a total of 32 indicators during the process. The top 6 indicators in decreasing order of importance were (i) the extent and quality of forest cover, (ii) tree species diversity, (iii) adequate market access, (iv) forest density, (v) orchard area, (vi)
and number of landslides and avalanches. The others were water flow consistency; reforestation and regeneration of area; population growth/family planning; clean water availability; scenic beauty; grazing and haying area; amount of erosion; cash crop area, etc.

Ramachandran (2002) made an attempt to develop indicators to assess the sustainability of environment and development at national and regional levels. For the purpose of assessment of sustainability at regional level, the author selected 7 variables representing demographic and social amenities as indicators of quality of life. These are: population density, percentage of female literates to total female population, percentage of workers to total population, percentage of agricultural laborer to total worker, percentage of electrified villages to total villages, percentage of villages with drinking water, and beds in allopathic hospitals/dispensaries per 100,000 population.

Similarly, Ramachandran adopted 6 indicators such as percentage area under forests, percentage area under pastures, percentage area under culturable waste, percentage area under barren and uncultivable land, cropping intensity and per capita availability of food grains per day to denote the state of environment. After ranking the variables she computed a composite index and assigned rank to the areas according to the position in the composite index.

2.2 Methodology

Methodology is a set of rules and procedures which indicates how research and arguments are to be conducted within the framework of disciplinary research philosophy. It deals with information collection, processing, organization as well as analysis techniques. The use of methodology allows accumulation of a disciplinary store of knowledge and the results of works aimed at comprehending a particular topic which are accepted as valid because they were collected within the criteria of epistemology and
ontology that are part of the relevant theory (Johnston, 1984). The present research intends to adopt methodology practically as a general research design and relationally as a key interrelated component of scientific practice. In order to exemplify the aspects of methodology, Bradshaw et al. (2001) presented an overall design (Figure 2.1).

Fig. 2.1: Location of methodology in a scientific movement between reality and knowledge

--- EPISTEMOLOGY (Including personal values and belief) ---

Theory

---------------------------------------- Research -----------------------------------------------

Reality—Generation—Formulation—Production—Analysis—Explanation—Generalization — Knowledge
of interest of questions of data of data & prediction

(Methods) (Techniques)

----- Methodology -----

--- ONTOLOGY (Claim) status of the relation of knowledge to reality; and --- (Constitutive) words and practices that make up the world

The figure identifies that methodology is the scientific movement between reality and knowledge with several intervening components. The present study is influenced by the logic displayed in Fig. 2.1 and sets its overall research design by mixing and multiplying varying methods. In this context, the research intends to gain the basic understanding of the relationship between ethnicity, resource management, livelihood practices, adaptive strategies as well as environmental perception of rural people. This interest of the researcher has led to formulate the statement of the problem and research questions which are translated into the objectives of the study. The data are essential part of the analysis to verify the facts and to enter into explanation, generalization and prediction of the realities. Ultimately, the outcome of the entire movement is the attainment of knowledge of the ground realities.
Figure 2.2: Characteristics of the methodology adopted

<table>
<thead>
<tr>
<th>Time Frame:</th>
<th>Present</th>
<th>Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific Practice:</td>
<td>Research</td>
<td>Analysis</td>
</tr>
<tr>
<td>Research &amp; Application:</td>
<td>General, Quantitative</td>
<td>Specific, Qualitative</td>
</tr>
<tr>
<td>Research Methods &amp; Sources of Data:</td>
<td>Interview, Sample HHs, Maps and Image, Secondary data</td>
<td>Interview, Key respondent, Observations, PRA, Focus group discussion</td>
</tr>
<tr>
<td>Techniques:</td>
<td>Descriptive, Statistical, GIS &amp; RS</td>
<td>Universal approach (Description, classification &amp; synthesis)</td>
</tr>
<tr>
<td>Guiding Philosophy:</td>
<td>Positivism</td>
<td>Humanism and Structuralism</td>
</tr>
</tbody>
</table>

Figure 2.2 illustrates the methodology adopted in the present study with characteristics viz. time frame, types of research, research methods as well as techniques. These are elaborated in relevant places in this section.

2.2.1 Data Production

To achieve the objectives, the study adopts integrated methodology of generating spatial biophysical data from space science technology and collection of primary socio-economic data from the field. Remote Sensing (RS), Geographical Information System (GIS) and other quantitative tools are extensively used in mapping and analyzing the issues of land use dynamics, natural resource management and in evaluating the indicators of sustainability. The schematic diagram illustrates the methodology as well as different steps adopted in order to pursue the research (Figure 2.3).
To cover the first objective, three time series land use maps have been prepared. LRMP (Land Resource Mapping Project) maps of 1983 - 84 prepared by Survey Department of Nepal have been used as base land use map. The topographic maps prepared by the Survey Department based on the information of 1992 together with the aerial photographs of the same period have been used to generate second time series land use map. Similarly, maps of slope, elevation, aspect, road, river and settlement have been generated using topographic map of 1992. Finally land use map 2004 has been prepared based on IRS 1D satellite imagery of March 2003 and limited updating during field survey in November-December, 2004. Arc View GIS 3.2a version and ERDAS Imagine 8.4 version software are used in mapping and analysis of spatial data. The uses of land and their changes during 1984 - 2004 have been evaluated with respect to physical environmental variables using GIS software. The information generated through these processes have also been used for evaluating ecological sustainability.

Besides the space-borne data and available secondary data, primary data needed for the study were collected from the field. Guided by specific principles, the study is based on a combination of quantitative and qualitative data. Quantitative techniques are proved to be useful in scientific study particularly in testing the hypothesis formulated. Moreover, it is characterized by experimental settings, identification of behavior, adoption of principles of natural science, deductive approach, pursuance of scientific laws and realistic perspective.
However, during the last two decades, human geographical methods and analysis have slowly shifted from quantitative to qualitative techniques. Qualitative methods that explore the feelings, understandings and knowledge of others through interviews, discussions or participant observation are being increasingly used by geographers to explore some of the complexities of everyday life in order to gain a deeper insight into the processes shaping our social worlds (Limb and Dwyer, 2001). It is characterized by natural settings, search for both objective and subjective meaning, inductive approaches, and identification of cultural patterns and idealist perspective. Therefore, it is used to verify, analyze, interpret and understand human behavior and has been found to be very
helpful in understanding the human-environment relationship. Though the two are 
generally characterized as opposing or conflicting methodologies, now-a-days there is a 
trend of using mixed methods by combining qualitative and qualitative data (Hay, 2000).

To collect necessary primary data from the field, methods like rapid rural 
appraisal, focus group discussion, interview based on structured questionnaire, unstructured interview for key respondents and marginal observation have been adopted. Except for the interview based on structured questionnaire method, all other methods aim at qualitative data generation.

During data collection in the field at first Rapid Rural Appraisal (RRA) was carried
out in all the three VDCs to generate inventory on communities and settlements. RRA is an effective and less time consuming method to generate inventories on various issues of an area. The method helped to identify 21 representative settlements covering the dominant communities living in different biophysical conditions. Eight settlements of Brahmin/Chetri communities are chosen to represent lower, middle and higher elevations and the related activities. Only two settlements of Dalit communities are there in the study area and both are considered for the study. The presence of Newars only in two VDCs put restriction in drawing samples for the community in four settlements of Jitpur and Murtidhunga. Similarly, the presence of Magar, Limbu, Sherpa and Rai communities in fewer settlements provided limited option in selecting settlements of these communities. Ultimately it led to varied number of samples per community.

Focus group discussion was the second step in the field methods of the present study. The technique is useful in evaluating the general characteristics of the settlements. This was used in all 21 settlements before any data collection practice was undertaken. Focus group discussion is a meeting among 4 - 8 individuals who are brought together to discuss a particular topic chosen by the researcher(s) who moderate or structure the discussion. It is commonly used to gain understanding of the ways in which members of the public talk about an issue prior to the design of a psychological experiment or a social
survey questionnaire (Limb and Dwyer 2001). In the present study, the method was used first to categorize the households (HHs) of the selected settlements into rich, intermediate and poor categories.

Rich, intermediate and poor categories of households in the sample settlements were defined through focus group discussion based on the local context of agrarian rural economy. The same procedure may not be meaningful in urban context. A household with savings more than NRs. 50,000 per year and sufficient food throughout the year was categorized as *Rich*. Similarly households with food sufficiency throughout the year and savings up to Rs. 50,000 were categorized as *Intermediate*. The households with neither food sufficiency for the whole year nor savings are categorized as the *Poor*. The focus group discussion technique has been found to be helpful to generate information on the community perceptions of resources, livelihood, adaptive strategies, sustainability and developmental activities. During the focus group discussion, selection of criteria for measuring sustainability was also an important point.

The sustainability indicators developed by the researcher from the literatures and the concepts of human-environment system of the mountain areas were shared with the groups. The groups suggested for modification of some of the indicators. Finally negotiation was made for five indicators of ecological components, four for economic aspect and seven for social aspects in the analysis of sustainability status of the area.

Household survey through questionnaire is the key technique for quantitative data collection. In this research, this is used to collect the basic information such as population structure, income, landholding size and information relating to livelihood activities along with adaptive strategies of the individual households. As such, this information are found to be valuable to achieve the third and fourth objectives and to verify the second, third and fourth propositions. The sample frame shows the settlements covered and sample households of the communities in different settlements (Table 2.1).
Table 2.1: Sample framework used for household survey

<table>
<thead>
<tr>
<th>No.</th>
<th>Community</th>
<th>VDC</th>
<th>Settlement</th>
<th>Population HHs</th>
<th>Sample HHs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
<td>Rich</td>
</tr>
<tr>
<td>1</td>
<td>Dalits</td>
<td>Jitpur</td>
<td>1. Nageswari</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Mangdine Tol</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Brahmin/Chetri</td>
<td>Jitpur</td>
<td>1. Arkhaule</td>
<td>35</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Ratmata</td>
<td>32</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Jitpur</td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Murtidhunga</td>
<td>4. Sepini</td>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Ahele</td>
<td>45</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6. Ganeshtar</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Parewadin</td>
<td>7. Majhuwa</td>
<td>48</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>8. Dahal Gaun</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>Newar</td>
<td>Jitpur</td>
<td>1. Arkhaule</td>
<td>75</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Jitpur</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Murtidhunga</td>
<td>3. Jarengeni</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. Srishe</td>
<td>13</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Magar</td>
<td>Jitpur</td>
<td>1. Sanodhode</td>
<td>46</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Thulodhode</td>
<td>60</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Yanglabun</td>
<td>70</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Limbu</td>
<td>Parewadin</td>
<td>1. Charghare</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Parewadin</td>
<td>94</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>Sherpa</td>
<td>Parewadin</td>
<td>1. Bokra</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Rai</td>
<td>Parewadin</td>
<td>1. Rai Tol</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>21</td>
<td>768</td>
</tr>
<tr>
<td>Percent</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td>41</td>
</tr>
</tbody>
</table>

The number of the sample households was kept minimum as far as possible based on the idea that limited samples properly taken from the population can replicate the reality: large number of samples may show repetition of the same fact. Random sample survey was used to identify the HHs to carry out interview with the family heads using a structured questionnaire. However, mention may be made here that due to absence of households in the rich category for certain communities (Dalits, Newar, Limbu and Rai) equal proportion in sample could not be maintained. As a result, the percentages of sample households in rich, medium and poor categories become respectively 20, 34 and 46. The total number of sample household was 195. Of these, 45 households were chosen from Brahmin/Chetri communities from as many as eight settlements. Similarly, Dalits, Magar, Newar and Limbu communities represent 30 households each. As the number of households of Rai and Sherpa communities is
limited, only 15 samples per community were taken.

Key informants interview is now-a-days widely used in data collection. In the present study, unstructured interview was made with the key informants to generate the required data. The importance of this technique lies in the fact that it focuses on personal perception and histories, rather than being questions focused like a structured interview, or content focused as in the case of a semi-structured interview format. The unstructured interview is informant focused ((Hay, 2000). The present work used the key informants to generate qualitative information to explore the indigenous knowledge, resource use and management practices of different ethnic groups from historical past and the perception/attitude of the local people. In the process, seven key respondents from all the seven communities were interviewed to achieve the objectives. The information generated through this process was used in discussing the second objective of the study.

Marginal observation was adopted during the field study to monitor the community behavior as well as activities, natural resource use and degradation areas. This method minimizes the possibility of fallacy and inaccuracy of information collected. The technique was also extensively used to observe settlement pattern, family structure, agricultural practices and other features which may not be available through other means of data collection.

The field notes proved helpful to check and verify the collected data. Furthermore, it also helped to recall the forgotten points in the stage of explanation and analysis. Observed phenomena, records, events, particularly the qualitative information were recorded in the notes.

2.2.2 Data Analysis

The raw data collected through different techniques as discussed above, needed editing and tabulation before their analysis. In the first step, information were carefully
edited for any missing and incomplete answer. The household information collected through questionnaire were coded and tabulated using data processing software Microsoft Excel. The process resulted in a mega table with all the questions and answers as per the questionnaires. Meaningful short tables were generated from the mega tables and used in different chapters as per requirement.

Similarly various RS/GIS operations using Arc View and ERDAS Imagine software were used in spatial analysis of biophysical databases which resulted in hundreds of maps and tables. Only those which are essential and appropriate have been used in the discussions.

Data analysis which follows data processing is a crucial aspect of research. The task of analysis is to bring order out of the notes to pick out the central theme of the study and to carry them across the written works (Baker, 1994). It involves organization of the primary numerical information collected through different methods, the secondary data and making sense of the qualitative data. The universal approach (description, classification and connection) as elaborated by Kitchin and Tate (2000) was adopted in making sense of the qualitative data collected from the field.

Analysis of data using both qualitative and quantitative techniques helped in description, explanation and generalization of the reality and to acquire the intended knowledge. Various techniques - descriptive, discourse and statistical analysis supported by tables and figures were used to achieve the objectives and to verify the propositions.

2.2.3 Field Experiences

Field survey was conducted for five weeks during November-December, 2004. The time was suitable from the point of weather and response of the agrarian households. During the period, the activities of the Maoist insurgents and the operation by armed forces of the government were simultaneously going on in the area. The field
survey was to be carried under such circumstances. The researcher hired six local assistants from the community itself in the three VDCs to cope with the difficult situation and to ease the situation for household survey. Further, these assistants were helpful in organizing the focus group discussions and the interview with the key respondents.

The work initially intended to cover the entire area between Mangmaya and Laxmi khola from the banks of the Arun river as the study area. The proposed study area included Legua VDC also in the downstream. Moreover, it would have been better to include one more VDC having mostly north facing areas. But the on going war-like situation and a cross firing at Siduwa area on December 18, 2004 which the present researcher happened to experience diverted the mind. The local people of the area suggested not to take risk any more by visiting the Hatikharka and Legua VDCs. Thus data could be collected from Jitpur, Murtidhunga and Parewadin VDCs only and ultimately the size of the study had to be reduced. However, considering the difficulties faced by the researcher during the field work due to unforeseen situations, the three VDC areas that have been covered are found to be sufficient so far the aims and objectives of the study are concerned.

The field visits had not only difficult moments but also some significant learning on several issues relating to different communities. The respondents were comfortable while talking with the assistants whom they knew and became curious for the fact that some one is paying them for collecting information from the villagers. It should be mentioned here that the area was not covered by any doctoral research scholar earlier and as such the local people were particularly interested to know the reason for selecting their area by a researcher whose working place Kathmandu is far away from their area. Some of the people were even very curious about the issues of research and shared their ideas freely and positively.

No any respondent opposed to share his personal knowledge and information during the time of data collection. However, a brief talk, before the task to convince them
that the information shared would not be divulged and secrecy would be maintained, worked positively. Female respondents from the communities other than Brahmin/Chetri and Newars were more versatile than the above two communities who were a bit reluctant to share personal information.

Similarly, some of the richer households were found to have a tendency to reduce their income and saving status. In certain cases, some modifications were made by the local field assistants on the basis of their own knowledge about the matter. Interesting results occurred in the evaluation of shelf status: some of the richer households expressed themselves to be of intermediate level, while some other of the intermediate level tried to put themselves in the poor category. In contrary, several poor households tried to hide their poverty in overall status (not in income) and put themselves in the intermediate level. In sum, it can be said that the interaction with the people in the mountain environment was, by and large, fruitful and the moments passed there were exciting, joyful and memorable.

2.3 Conceptual Basis

Geography has meant different things to different people at different times and in different places (Livingstone, 1992 quoted in Kitchin and Tate, 2000). The history of the discipline shows notable variation in the subject matter chosen and in approaches of research. Yet most of the geographers do accept it as a study of society in relation to location and space. The existing literatures suggest that the relationship is somewhat more distinct in the mountain areas than in the plains. In the mountain environment, the dependency and interaction with nature are direct and visible almost in all kinds of human activities.

The existing literatures further specify that socio-cultural dimension exerts distinctive influences on these relationships. The existing knowledge and mental images
of space and location are guided by existing technology, culture and spatial processes. All these influence human decisions, more particularly in the mountain areas which in turn are responsible for creating different livelihood patterns. Hence it is commonly observed that much emphasis is given to the study of ethnic response to environment and planning for development of mountain areas. On the other hand, migration of people from mountain to plain has become an increasingly interesting aspect to take note of. Most of the mountainous areas of Nepal hold promise for this kind of study.

The available and already reviewed literatures present a trend of focusing on the issues of specific area and community in the study of man-environment relationship. None of the reviewed literature, however, illustrates the issues of a diversified mountain area with a focus on community perspectives. For example, Chambers focused on the theoretical issues of livelihoods, whereas Bhurtel, Dahal, Subedi and Pandey carried out specific community-based studies. Bishop highlighted the issues of the remote areas that suffer from the problem of inaccessibility. Similar trend can be observed in the joint research work of CIDA and CISI. On the other hand, Cecilla and Timilsina emphasized on the development of road network which results in more livelihood options for the inhabitants. In the same way, Papola, GTZ and FAO advocate for an overall policy formulation towards improving livelihoods in the mountains. Under such circumstances the present research holds enough significance as it covers issues of livelihoods, adaptive strategy and sustainability from the perspectives of man-environment relationship in a biophysically diverse mountain area.

The emphasis given on the role of communities in the evolution of the situation has provided necessary background to develop four propositions to be verified based on the study of the community activities. One of the propositions is concerned with the identification of roles of accessibility and market in diversification of livelihood activities. Similarly, the last proposition has been developed on the basis of the concept of increasing population and decreasing natural resource base in the context of changing
perception of the people across generations.

Sustainability is a major concern of the day but in-depth analysis of it at the household level pertaining to a community sharing a micro mountainous area is almost absent as yet. Therefore, effort has been made to develop indicators of sustainability and to evaluate them in the context of the area under study. Also, it has been tried to generate index of ecological, economic and social dimensions and composite index of sustainability for the communities in the area. It might not represent the reality hundred percent, but would certainly help generalize the picture of the area and provide necessary foundation for further investigation.

As far as possible the study takes the advantage of using certain relevant features of the positivistic, humanistic and structural approaches. This has facilitated the use of relevant qualitative as well as quantitative methods in preparing and arranging the data for meaningful analysis. Similarly the facilities of the computer-based data processor, remote sensing as well as geographical information system (GIS) have been utilized in the best possible way to make the observations and findings accurate and representative of the ground realities.

References


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