

# PLANNING STRATEGIES FOR SUSTAINABLE DEVELOPMENT OF SHIMLA CITY

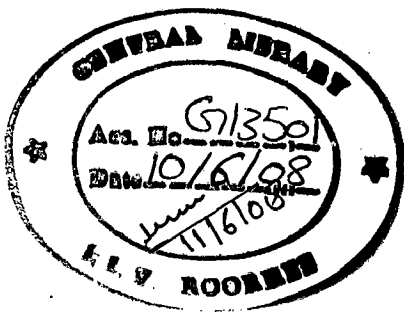
## A DISSERTATION

*Submitted in partial fulfillment of the  
requirements for the award of the degree  
of*

**MASTER OF URBAN AND RURAL PLANNING**

*By*

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JUNE, 2007

## CANDIDATE'S DECLARATION

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I hereby certify that the work, which is being presented in the dissertation, entitled "**PLANNING STRATEGIES FOR SUSTAINABLE DEVELOPMENT OF SHIMLA CITY**", in partial fulfillment of the requirement for the award of the Degree of MASTER OF URBAN AND RURAL PLANNING submitted in the Department of Architecture and Planning, Indian Institute of Technology - Roorkee, is an authentic record of my own work carried out during the period from May 2006 to June 2007 under the supervision of **Prof. R. K. Jain**, Associate Professor, Department of Architecture and Planning, Indian Institute of Technology - Roorkee.

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

Place: Roorkee

Dated: June, 2007

  
(Ajay Sharma)

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

Place: Roorkee

Dated: June, 2007

  
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First of all I would like to thank almighty for giving me strength to complete this work in spite of my bad health.

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**Ajay Sharma**

Dated: June, 2007

## ABSTRACT

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The concept of Sustainable Development was first time brought by World Commission on Environment & Development in 1987. After this, various organizations, groups started advocating the concept of sustainable development for the overall well being of earth and its inhabitants. In the field of planning also sustainable development assumed a significant importance, as cities all over the world were facing many problems due to unsustainable practices.

Similarly, the concept also gained momentum in hilly areas and various organizations were formed at national and international levels for sustainable development of hilly areas. Present study also deals with the sustainable development of the Shimla city which is one of the fastest growing hill city of the Hindu-Kush Himalayan region.

Shimla was planned by Britishers in 1865 for the population of 20000-25000 but today the population has increased to 174,789. Present day, Shimla is in great contrast to its glorious past. Shimla is a capital of Himachal Pradesh, which came into being on 25 January 1971. Being the state capital of a relatively young state, it is pulsating with tremendous pressure of activities, due to large number of development programmes, numerous departmental and administrative functions of a capital, leading to the problems of governance and management. The city is suffering from many problems due to unsustainable practices. Considering the limited resources in the vicinity, sustainability of the city is being constantly challenged.

In this study various parameters were identified for the settlement level sustainable development and study has been conducted on the lines of only three broad and influencing parameters as following –

1. Economy
2. Ecology & Environment
3. Physical Infrastructure

In Shimla, water availability and its management is one of the prime area of concern, which could inhibit the growth of the city in future. Considering this fact Water Supply based Carrying Capacity Analysis has been carried out and maximum carrying capacity of the city has been suggested.

Finally, a comprehensive set of strategies have been proposed for the improvements in Economy, Ecology and Physical Infrastructure, so that sustainable development is achieved. Simultaneously, general recommendations have been given to further strengthen the goal of sustainability of the city.

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# **CHAPTER - 1**

## **INTRODUCTION**

**1.1 Background**

**1.2 The changing concept of development**

**1.3 Sustainable development**

**1.4 Various perspectives on sustainable development**

**1.5 Three dimensions of sustainable development**

**1.6 A sustainable city**

**1.7 Sustainable development and carrying capacity**

**1.8 Levels of sustainability**

**1.9 Settlement level parameters of sustainable development**

**1.10 Sustainable development in context of hill towns**

**1.11 Need for the study**

**1.12 Relevance of the study**

**1.13 Aim**

**1.14 objectives**

**1.15 Scope & limitations**

**1.16 Methodology**

# 1. INTRODUCTION

## 1.1 BACKGROUND

Mountains have grandeur, beauty, and spiritual importance, but they are also a repository of natural resources such as water, minerals, biological diversity, ancient human cultures, and traditions. We firmly know in India, mountains play an important role in regulating the climate and meteorological conditions of a country.

It is estimated that 10% of the world's population depends on mountain resources. The hill areas of India, particularly the Himalayan and the Western Ghats regions, constitute about 21% of the total area and support about nine per cent of the total population of the country. The Hindu Kush-Himalaya (which extend over a distance of 3, 500km from Myanmar in the East to Afghanistan in the West, and range from the Tibetan Plateau of China in the North to the Ganges of India in the South) mountains are one of the most resource rich ranges in the world. The concern for these mountains arises not only from the point of view of people living there but also for the survival of the societies in the valleys and plains which depend on mountain resources, especially water. The security of the plains also depends upon the ecological security of the mountains and hills.

The Himalayan region covers a distance of about 2,500 km from East to West, with a width range of 250-300 km. From these lofty mountains originate the perennial river systems of the Indus, Ganges, and the Brahmaputra, the tributaries and waters of which have brought down fertile soils that have

sustained civilizations in the plains. They protect the country from the arid cold winds of the central Asian land mass and play a crucial role in the monsoon rains. The Himalayan mountains are the youngest mountains and are tectonically very active, leading to frequent earthquakes, More than a dozen earthquakes equal to or exceeding a magnitude of 7.5 have occurred during the past 100 years. For geological and topographical reasons, the Himalayan ecosystems are ecologically fragile. They are also banks of tremendous biodiversity. Large scale human activities in the region, mainly in the past few decades; particularly extensive deforestation, intensive farming on steep slopes, heavy human & livestock pressure on soil, water, and biological resources, and the adverse impacts of development, have resulted in overall environmental degradation and depletion of life-support systems in urban as well as rural areas of this region.

The Government of India has taken several initiatives in the last four decades to restore the ecological balance in Himalayan region. Among the major or recent initiatives was the establishment of the G.B. Pant Institute of Himalayan Environment and Development, in 1988 to evolve strategies for and gain knowledge in sustainable development of the mountain and hill areas and to improve the living standards of the people in these regions.

## **1.2 THE CHANGING CONCEPT OF DEVELOPMENT**

The need for integrating environment with development is best put forward by the concept of sustainable development. In spite of many definitions the central theme is the notion that *current decisions should not damage prospects for maintaining or improving living standards in the future*. In other words the current efforts to improve the living standards of the people should not degrade the natural resources and the environment as this would reduce the options and opportunities for future generations (Pearce 1990, & WCED 1987)

The concepts and meaning of development are undergoing many significant changes. From a very narrow interpretation of development as representing growth in capital stock, the concept has continued to acquire different dimensions such as employment generation, income redistribution, human resources development, poverty eradication, integration of the gender perspective, and, more recently, the management of the environment and natural resources. While many of the earlier issues were raised in particular response to the socioeconomic problems of the developing countries, the present concerns of the environment have arisen out of the problems seen in both the developing and developed countries. In other words, environmental problems have been created by conditions of both poverty as well as prosperity.

Indeed with the build up of CO<sub>2</sub>, depletion of natural resources such as the forests, and degradation of the fragile ecosystem, the combined effects pose serious threats to ecosystems, cities, regions, countries, continents, and even the entire globe. It is argued therefore that development must integrate not only the earlier socioeconomic concerns but also the biophysical aspects related to the preservation of the environment and natural resources. This approach to environmental management and its integration with development goes far beyond pollution abatement.

Our life styles should be made environmentally sustainable at all levels, if the future of our physical world is to be safeguarded. Learning from our past mistakes has become even more urgent and critical, because it is only through the learning process that deterioration may be slowed down and improvements accelerated (Boulding, 1991)

It would be gross negligence on our part to be concerned with environmental issues only when natural disaster strikes. In many parts of the mountains, some

form of disaster has become an almost regular feature. With each such disaster, and its adverse impact on the natural and economic resources of these areas, the vulnerability of human populations has increased. As many of these disasters cannot be controlled, the only solution lies in adaptation, and development interventions must help in better adaptations to the prevailing conditions (Harrison, 1987)

The extent to which people are surviving at dangerous margins in mountain areas is growing and development must come to grips with the environmental imperatives through a systematic and effective integration of environment and development and not simply through grafting on a few environmental programmes here and there.

### **1.3 SUSTAINABLE DEVELOPMENT**

Sustainability is a concept on which social and natural scientists and intellectuals from all walks of life have aired their views from time to time. Most discussions focus on necessary conditions to ensure that future generations have the resources which they require for their existence.

The origin of the concern for both environment and development go back decades. It was in the seventies that the report by the 'Club of Rome' cautioned that economic collapse could soon occur as the resources are limited and controlling population would be a costly proposition. Various conferences and seminars at international and national level have since expressed their concern about environment. The use of the term sustainable development was promoted by the of Brundtland Commission (also known as World Commission on Environment and Development) in report named 'Our Common Future' published in 1987.

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World Commission on Environment and Development (WCED) brought sustainable development into the purview of governments and people around the world. WCED defined sustainable development as *“Development that meets the needs of the present without compromising the ability of the future generations to meet their own needs”*.

Finally as a result of many years of discussion and debate, the global environmental managers reached a conclusion at the Earth Summit at Rio De Janero (Brazil) in 1992 and formally adopted the concept of sustainable development.

The concept of sustainability was thoroughly explained and discussed under Local Agenda 21 of the UNCED in 1992. A noting from conference highlights the role of local government in sustainable development process as, *“Because so many of the problems and solutions being addressed in Agenda 21 have their roots in local activities, the participation and cooperation of local authorities will be a determining factor in fulfilling its objectives. Local authorities construct, operate, and maintain economic, social, and environmental infrastructure, oversee planning processes, establish local environmental policies and regulations, and assist in implementing national and sub-national, environmental policies. As the level of governance closest to the people, they play a vital role in educating, mobilizing, and responding to the public to promote sustainable development.”* (UNCED, 1992)

Sustainable development further refers to that kind of growth which is determined by environmental quality. One of the main points of this is that the development activities are to be integrated with the environmental policies. Issues related to growth and development are the problems of multidisciplinary nature which require an integrated approach by anthropologists, engineers,

planners, scientists, economists, forest experts, industrialists and the beneficiaries of the development activities (Mukherjee BM,1990).

A sustainable community seeks to maintain and improve the economic, environmental and social characteristics of an area so its members can continue to lead healthy, productive, enjoyable lives there.

#### **1.4 VARIOUS PERSPECTIVES ON SUSTAINABLE DEVELOPMENT**

At the moment the concept of sustainable development is a fashionable one. There are a lot of interpretations of the concept. Not only the perceptions vary but the concept also generates contention over the amount and kind of development action that is sustainable and for how long and to what effect.

The term has been interpreted differently by people of different ideologies like the Developed countries of North refer to it in terms of most efficient exploitation of the natural resources for further economic prosperity-within the regenerative capacities of nature while the poor South refers to it in the context of provision of basic needs to everyone.

Some other definitions/views are as following -

- **Monto Mani, Koshy Varghese, (2004)**

Both rural and urban settlements are exploiting the surrounding natural environment. They are responsible for altering natural processes that are predominately equilibrium oriented. Restoring and maintaining the health and integrity of the natural environment is fundamental to sustainability of human settlements.

- **M. Sohail, A. P. Colton (2004)**

It has been recognized that neither community nor government alone can ensure the sustainability of infrastructure, a partnership approach is needed.



- **A.K. Mukherjee (1997)**

Environment is the key factor for sustainable development. Population, Urbanisation, resource trends, land quality, pollution etc. are affecting the environment and utilization of resources with environmental conservation is better for sustainable development.

- **Kaelmiel Wekwete(1998)**

Sustainable Development = Effective systems of urban planning and Management to distribute scarce resources (urban) of land, water and energy for population as a whole.

- **Heinen (1994)**

No single approach to 'sustainable development' or framework is consistently useful, given the variety of scales inherent in different conservation programmes and different types of societies and institutional structures.

- **Holdgate (1990)**

Development is about realising resource potential, Sustainable development of renewable natural resources implies respecting limits to the development process, even though these limits are adjustable by technology. The sustainability of technology may be judged by whether it increases production, but retains it other environmental and other limits.

- **Edward Barbier (1987)**

The concept of sustainable development as applied to the third world is directly concerned with increasing the material standard of living of the poor at grass root level, which can be quantitatively measured in terms of increased food, real income, educational services, health care, sanitation and water supply etc. In general terms, primary objective is reducing the absolute

poverty of the world's poor through providing lasting and secure livelihood that minimize resource depletion, environmental degradation, cultural disruption and social instability.

- **Robert Allen (1980)**

Sustainable development is a development that is likely to achieve lasting satisfaction of human needs and improvement of the quality of human life.

- **UNEP, WWF**

Sustainable development, sustainable growth, and sustainable use have been used interchangeably, as if their meanings were the same. They are not. Sustainable growth is a contradiction in terms: nothing physical can grow indefinitely. Sustainable use, is only applicable to renewable resources. Sustainable development is used in this strategy to mean: improving the quality of human life whilst living within the carrying capacity of the ecosystems.

- **Latin American Authors**

Sustainable Development means meeting the needs of the poor.

## **1.5 THREE DIMENSIONS OF SUSTAINABLE DEVELOPMENT**

### **1) Ecological**

This dimension mainly deals with the maintenance of the natural environment including more efficient use of the natural resources and decrease in waste production. Some of the main issues are monitoring climate change and maintaining bio-diversity.

### **2) Economic**

Economic sustainability can be reached through optimized distribution of goods and services. Income generation and poverty reduction are the main issues in this area. Improving business process efficiency and

productivity, as well as creating a balance among various regions, are issues bridging the economic and social dimensions.

### **3) Social**

Social sustainability requires a mechanism of redistribution of wealth, giving more equal chances to everyone. This area is particularly wide, including many aspects as employment, health, education, infrastructure and overall participation in society.

## **1.6 A SUSTAINABLE CITY**

A "sustainable city" is a city designed, constructed, and operated to minimize waste, efficiently use its natural resources and to manage and conserve them for the use of present and future generations.

*There is no single template of sustainability -- cities, towns, and villages nationwide have individual economic and environmental features and social needs. By addressing these specific needs and characteristics simultaneously, sustainable approach creates a balance between growth and development and the limits set by ecology. (UNCED, 1992)*

Every area should be investigated based on its unique problems and constraints posed by natural resources. Different areas pose all together different set of challenges to achieve sustainable development. These challenges can only be met by thorough investigation of that particular area.

## **1.7 SUSTAINABLE DEVELOPMENT AND CARRYING CAPACITY**

"Carrying capacity" usually refers to a population level that can be supported for an organism, given the quantity of food, habitat, water and other life infrastructure present. Carrying capacity is thus the number of individuals an environment can support without significant negative impacts to the given organism and its environment.

Below carrying capacity, populations often have good living standards, while above, it will start deteriorating. The carrying capacity of an environment can change over time due to a variety of factors including: food availability; water supply; environmental conditions and living space.

It is possible for a place to exceed its carrying capacity temporarily but this situation can not last long.

Earlier concept was used for biological carrying capacity of the areas but nowadays concept has gained acceptance in various other fields like industry and city planning.

Human life depends on healthy ecosystems which supply life-sustaining resources and absorb wastes. However, current growth and consumption patterns are placing increasing stress on ecosystems. Environmental degradation, biodiversity loss, deforestation, and the breakdown of social and economic systems are a few of the signs which indicate that ecosystems are stressed.

Ecosystems threatened by over burden and overwhelmed by more wastes than can be absorbed lose resilience (ie. the ability to absorb shocks and disturbances) and may suddenly break down and settle into a different system with less resilience. This implies there are thresholds at which the levels of stress will lead to the disruption of the system. One concept used to understand these critical limits and thresholds is carrying capacity which assumes that there are a finite number of people who can be supported without degrading the natural, physical, social, economic and cultural systems and, as such, "is an indirect measure of the maximum level of stress that the ecosystem can maintain". (Barbier, Burgess and Folke 1994). Given the interaction of ecological, economic, and social factors the disruption of ecosystems will have economic and social

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consequences. Also, fundamental changes in the economic and social subsystems will lead to changes in the ecosystem. However, there is a general lack of knowledge regarding ecosystem functioning and ecological limits to economic and social activity (ie. carrying capacity) and this has led to a greater acceptance of the precautionary measures and its use to guide policy and action. Sustainability and carrying capacity has direct relationship as sustainability of the system can only be assured when system respects the limits fixed by resources. In case of urban areas carrying capacity can be worked out based on various factors like water, land, physical and social infrastructure. Natural resources like water and land are finite and are deciding factors for the survival of the settlement in long run and therefore should given priority to find out carrying capacity of the urban area. Therefore, it is generally advisable to find out natural resource based carrying of a settlement.

### **1.8 LEVELS OF SUSTAINABILITY**

The concept of sustainability has been extensively explained by the intellectuals throughout the world at various times as explained in 1.4. It is generally observed that this concept varies with the level of application. There can be broadly three levels of sustainability as following -

1. Global
2. National
3. At settlement level

#### **Global level:**

At global level prime concerns are mainly two i.e. environment and economy.

#### **National level:**

At the level of nations, sustainability is viewed differently by different countries.

The developed world views it as the use of resources today should not reduce

real income in the future. The poor nations view it as commitments of resources towards sustained improvements in living standards, equal distribution of resources and fulfilling minimum basic needs.

**Settlement level:**

Sustainable development at settlement level adds on an entirely different set of parameters and have different priorities as per the nature and function of the settlement.

**1.9 SETTLEMENT LEVEL PARAMETERS OF SUSTAINABLE DEVELOPMENT**

There are no. of parameters at different levels of sustainability which are taken into account to achieve sustainability at those levels. But here, study only focuses discussion on settlement level sustainability. There are various factors which influence the settlement – its form, activities, linkages etc. Many of the factors are controllable at the settlement level like infrastructure (social & physical) and many cannot be controlled at the settlement level – they have regional implications. Some of the external influencing factors on a settlement are ecological factors, up stream land uses, soil erosion, water availability, economic linkages, energy supply etc.

For any settlement to be sustainable, it should satisfy the parameters of sustainable development. Sustainable development at settlement has three broad parameters as following -

**Primary Parameters –**

- Ecology
- Natural Resources

**Secondary Parameters**

- Physical Infrastructure
- Social Infrastructure

- 
- Traffic & Transportation
  - Energy

### **Tertiary Parameters**

- Economy
- Special Characteristics

#### **a) Primary Parameters –**

They are the most essential parameters of sustainability. Ecological stability of the areas is of prime consideration for the sustainable development and natural resources decide the limits of the development.

Primary parameters can have following sub-parameters.

#### **Sub parameters of Ecology:**

- i) Physical Deterioration
- ii) Pressure on resources
- iii) Stress of green areas
- iv) Geo – hazards
- v) Environmental pollution

#### **Sub parameters of Natural Resources:**

- i) Water – Availability, quality, supply
- ii) Land – land use, buildable potential, agriculture potential
- iii) Physiographic - Topography constraints, flood prone areas, minerals etc.
- iv) Flora and Fauna – Natural reserves, conservation zones

#### **b) Secondary Parameters**

They are also called main supportive parameters. They can be further classified into sub – parameters as following:

**Sub parameters of Physical Infrastructure:**

- i) Water supply – system type, distribution per capita, shortfall
- ii) Sewerage – Network, Discharge, treatment etc.
- iii) Solid waste – Management and disposal

**Sub parameters of Social Infrastructure:**

- iv) Education –type, number, distribution, shortfall
- v) Health facilities – type, number, distribution, shortfall
- vi) Socio-cultural facilities

**Sub parameters of Traffic & Transportation:**

- i) Connectivity – Networks, linkages, modes available
- ii) Traffic Volume
- iii) Parking

**Sub parameters of Energy:**

- iv) Energy – Consumption, fuel type, availability, sectoral breakup

**c) Tertiary Parameters**

These parameters comes at last and include Human resources, Socio-cultural and special characteristics.

1. Human resources – literacy level, availability and training
2. Socio Cultural
3. Special characteristics: Religious centre activities, needs of floating population, industrial and administrative characteristics.

When all three parameters of sustainability are satisfied, settlement is said to be fully sustainable. But analysis of the all parameters is a cumbersome job and requires large amount of time. So considering the time constraint study is generally conducted related to selected parameters only.



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## 1.10 SUSTAINABLE DEVELOPMENT IN CONTEXT OF HILL TOWNS

In case of hills towns following are the main things which govern the sustainable developmental practices of the area-

- Environmental Context.
- Carrying Capacities Constraints on urban development
- Tourism
- Infrastructure

In context of hill areas the basic issue is to maintain their basic life-support systems of the urban area. The various issues pertaining to development of urban habitat in hills relate to-

- Management (utilization and conservation) of Resources of land, water and forest.
- Management of Wastes
- Pollution of air, land and water;
- Transportation - both inter and intra settlements so as to improve mobility and efficiency
- Infrastructure
- Management of Tourism activities

Ecological considerations should form the new paradigms for planning in hilly areas, and not the functional and economic criteria alone. Therefore, the focus should be on efficiency of resource use, conservation and reduction of wastes going into environment to a minimum. Within the broad principles of 'Sustainable development, a directed effort should be made to enhance the 'Quality of life' through planning and management at all levels of the hill habitat through an Integrated Ecological Planning Process. Based on a clear understanding of the

fragility of the natural, the physical planning process should accommodate all factors of environment and ecology. The sequential steps in planning process should include determination of carrying capacities, strategies for regeneration of environmentally degraded areas, and planning for a balanced development of the towns with emphasis on high value tourism, conservation of heritage and greater involvement of local communities.

### **1.11 NEED FOR THE STUDY**

By the time the British left back in 1947, Shimla was a living model of meticulous planning, environment and development in consonance with ecological imperatives. During the post- independence era, however, it witnessed unprecedented degradation. In spite of mammoth mandatory provisions in force, consumerism forces dictated its destiny. Environmentally sensitive areas, particularly the green cover, has therefore, been worst hit. The proud heritage is dwindling. The residential areas are in a critical state. Intrusion of commercial activities in every part of the city is a bitter reality. There is a complete confusion in tourism industry due to the lack of infrastructural facilities. The institutional areas are overcrowding. Basic infrastructure is victim of temporary measures. Traffic and transportation chaos is persisting. Shimla city has thus become a sad story of its old glory. Although master plans have been prepared for the city (IDP - 2001, in 1978 and Draft IDP – 2021 in 2006) but development trend could not take a systematic way in the city and situation became worse with time. So it is high time to investigate what went wrong in planning of the city and then develop new strategies so that the problems which are compounding the city are identified and rectified on sustainable basis. Hence there is an urgent need to have an investigative surgery of the whole city and to start thinking towards new planning strategies with a fresh approach.

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## **1.12 RELEVANCE OF THE STUDY**

In a city like Shimla, where chaotic situation is persistent in every sphere of city life, sustainable development concepts can provide a solution which will be not only be effective but long lasting also.

Study focuses on the existing situation and an attempt has been made to bring out the gravity of the situation. Various critical areas have been identified and appropriate solutions have been suggested through various strategies.

At present Shimla is facing water crisis due to the limited sources in the vicinity. Study aims to come out with a max. water based carrying capacity of the city.

## **1.13 AIM**

Aim of the study is to develop “comprehensive strategies for planning in Shimla so that sustainable development is achieved”.

## **1.14 OBJECTIVES**

Following are the main objectives of the study:-

- Study of the city under various aspects like physical, social, economic to understand present status of the city.
- Study of environmental degradation and ecological imbalance caused by urbanization in the city.
- ✓• To find Water Supply based Carrying Capacity of the city
- To study Physical Infrastructure of the city.
- ✓• Formulation of various strategies for sustainable development

## **1.15 SCOPE & LIMITATIONS**

Study is be restricted to Shimla Planning area only which has been delineated in draft IDP - 2021. Secondary data have been collected from available published or unpublished literature including reports, journals, newspapers, govt. documents etc. Considering the time constraint, the term sustainability has been used related

to well established sustainability concepts and no special model has been applied to calculate the sustainability of the study area.

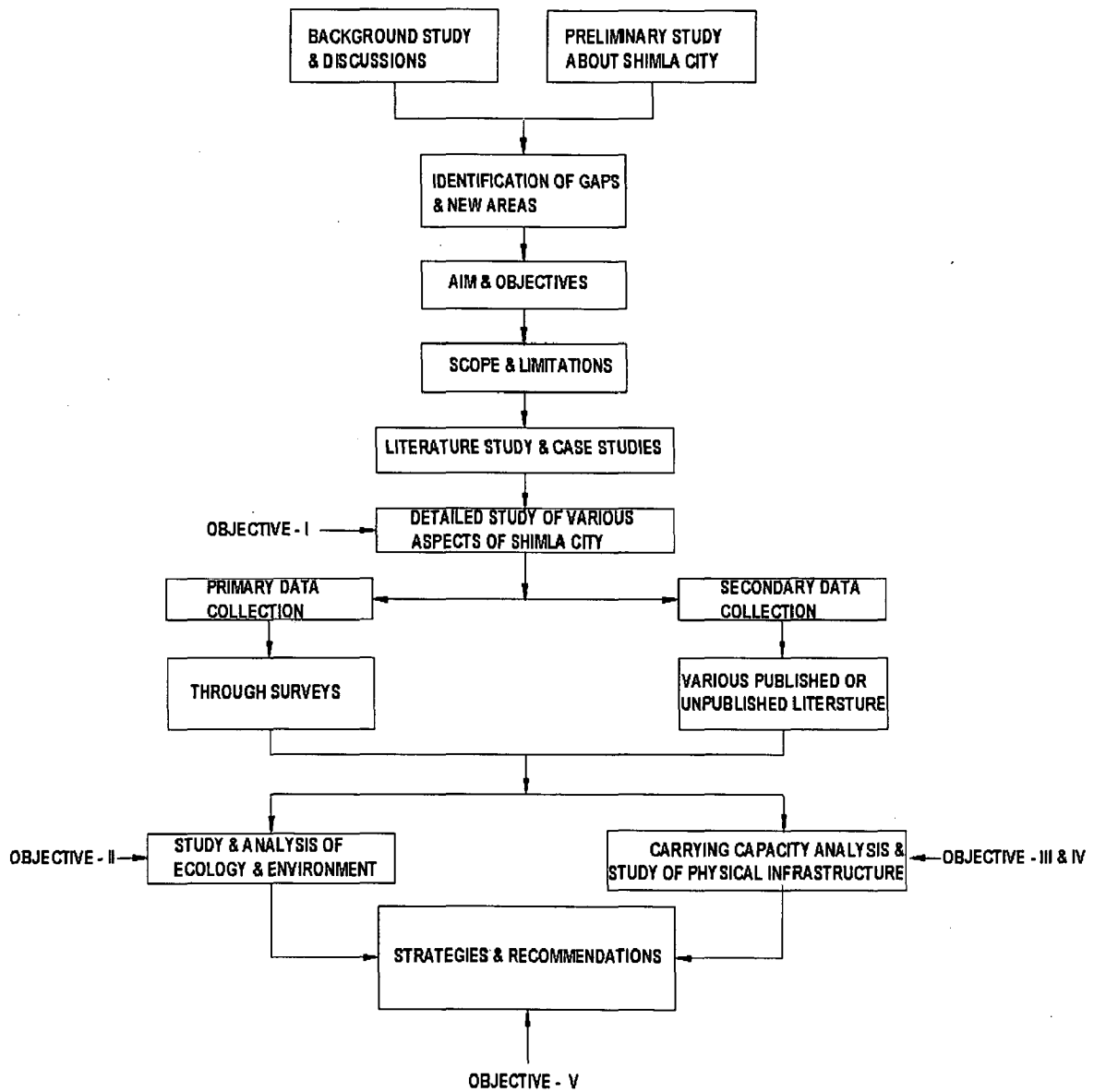
Due to time constraints Study is restricted to only three following parameters of sustainability -

1. Economy
2. Ecology
3. Physical Infrastructure

Carrying capacity analysis is restricted to water supply only.

## 1.16 METHODOLOGY

Fig. – 1.1 Methodology





# **CHAPTER - 2**

## **LITERATURE STUDY**

### **2.1 Overview**

- **Books**
- **Research Papers**
- **Reports**
- **UDPFI Guidelines**

## 2. LITERATURE STUDY

### 2.1 OVERVIEW

Literature study forms the basis for the actual area of study. Considering this fact variety of relevant literature has been referred and appropriate conclusions have been drawn so as to get a clear idea about the topic of study. Literature referred has been categorized in following heads –

1. Books
2. Research Papers
3. Reports
4. Norms and Standards

The area of literature survey covers various topics like definitions, general concepts, studies related to the context and various works carried out in the field.

#### (1) BOOKS

1. **Mukherjee, B. M. 'Technology for Sustainable Development', Guru Ghasidas University Publication, Bilaspur, M. P. 1990.**

#### **Introduction:**

This book is a compilation of the research papers presented at the National Seminar at Bilaspur in March, 1990. The main theme of the book is centered around how to ensure sustainability of resources in a settlement and a region. B.M. Mukherjee being editor of the book has given detailed elaboration about the concept of sustainability and its implications related to development. Throughout the book in various chapters focus has been on the fact that we need to institutionalize the environmental management in various walks of the life.



**Summary:**

The environmental quality and its perception is a multi-dimensional concept, highly subjective, easily variable and affected on the basis of individuals, groups, cultures and under these variables we decide on the prospects of sustainable development. Technology for sustainable development can be categorized under two distinct but inter-related types. One pertains to the alleviation of poverty, the process of socio-economic development which must receive the first priority. The second category is the protection of natural ecological systems whose healthiness otherwise will definitely affect prosperity.

Sustainable development refers to that kind of growth which is determined by environmental quality. One of the main points of sustainable development is that the developmental activities are to be integrated with the environmental policies. In one of the chapters of the book four principles of the sustainable development given by Jacobs (1987) have been highlighted and elaborated as following-

1. The fulfillment of human needs
2. The maintenance of ecological integrity.
3. Provision for social self determination
4. The achievement of equity.

**Inferences:**

1. Process of development is a continuous phenomenon and all facets of the development are invited in every sphere of the human activity but that development should not take place at the cost of environment and ecological degradation.

2. In today's world technology can play a very vital role in achieving sustainable development. But technologies should be adopted considering the context of developmental activities.
  3. Conservation and management of the natural resources should be given utmost priority for the overall development of the region.
  4. All strategies related to the sustainable development should primarily focus on environmental stability & ecological balance.
  5. All possible efforts should be made to use non-conventional energy sources in our developmental activities because they are ecologically far better and economically feasible at least for mini and micro developmental projects.
2. **Jodha, N. S. 'Sustainable Development in Fragile Environments', Centre for Environment Education, Ahmedabad, 1995.**

**Introduction:**

This book basically deals with the problems and prospects of sustainable development and resource uses in fragile environments, specifically mountain (hill) areas and the dry tropical areas in India. However this discussion can be applied to any area in the world having same characteristics.

**Summary:**

This book addresses the need for development policy that is sensitive to the special requirements of the regions that by virtue of their ecological characteristics are particularly vulnerable to stress from inappropriate uses and developmental activities. This book presents a basic argument that standardized and centralized development policy can lead to disastrous consequences in ecologically vulnerable areas. This book gives is a well documented piece of

information for the general awareness related to the sustainable development.

Author has started discussion with defining sustainability as following –

“Sustainability is the ability of a system to maintain a certain well defined level of performance over time and if required to enhance the same in response to changing needs, either by itself or through linkages with other systems, without damaging the long term productivity of its resource base and essential integrity of the system.”

Author further takes the discussion to various resources of the region, biophysical context of the un-sustainability, socio-Economic context of the Un-sustainability.

Finally author concludes that following are the key elements which should be incorporated in present day sustainable development strategies-

1. Local resource focus
2. Diversification of production system
3. Technological & institutional adaptations evolved in the context of location
4. Management

**Inferences :**

1. The pattern and intensity of the land use must be determined by the ecological profile of the area, so as to arrive at optimal and sustainable development strategies for each area.
2. While exploring the sustainable development strategies, there should be considerable emphasis on the need to integrate traditional wisdom to better address the requirements of the region.
3. Sustainable economy is one of the main parameters of the sustainable development. Hence while making planning strategies for sustainable development of the region and settlement, sustainability of economic

activities should be given due importance considering the context of the region or settlement.

3. **Singh, Tejvir, 'Studies in Himalayan Ecology and Development Strategies', The English Book Store, New Delhi, 1980.**

**Introduction:**

This book presents a detailed account of the Himalayan ecology and suggests a set of guideline for the developmental strategies for the hills. Book presents a holistic picture of the multiple problems of the Himalayan region and their likely solutions.

**Suggested guidelines for the Eco- Development of Hills:**

1. Hill area development can no longer be regarded as a mere extension of the developmental methods in the plains. So there should be a thorough study based planning in the hills considering the context of the planning.
2. The Hilly regions have its own peculiar environmental, social and economic problems calling for environment oriented planning as basic concept.
3. Important condition for development in hill areas is a considerable improvement in the infrastructure with power, irrigation, roads and water supply.
4. Tourism development of the hilly areas needs special attention in terms of a clear direction where ecology of the hills is not compromised for mere economic gains. Hence tourism activities should be properly planned and managed so as to safeguard the natural environment of the area.

**(2) RESEARCH PAPERS**

**1. Kostas P. Bithas and M. Christofakis, 'Environmentally Sustainable Cities- Critical Review and Operational Conditions' in Sustainable Development, Vol-14, January 2006.**

**Summary:**

Initially sustainability concept was started with the political objective which later provided ground for the scientists and analysts to carry research in the field. It has been argued that Cities have always been based on the concentration of humans and man-made elements, resulting in confinement of natural assets. Earlier the concept of environmentally sustainable development referred to abstract or to global economic and social system. The urban sustainability concept is a relatively new one. Various authors have expressed their views on sustainability but there is no consensus regarding the operational content. This paper examines the conditions for environmentally sustainable development in cities. The author has emphasised that the concept of sustainability needs special explanation an elaboration when it is applied to cities and that concept is different than that which is applied to larger geographic area. The natural and socioeconomic characteristics of urban systems should be systematically taken into account for defining environmentally sustainable development in cities. The paper proposes an operational framework for evaluating urban systems for their environmental performance. Some of main points brought out by author are as following-

**Several Alarming Malfunctions of the City –**

- Atmospheric pollution
- Creation of fluid and solid waste.

- Traffic congestion
- Criminality
- Social Alienation

In the light of these problems one is forced to analyse that marginal benefits deriving from additional growth of cities are considerably smaller than the respective social & environmental costs.

Necessary Conditions of sustainability –

1. Maintenance of the healthy biological functions taking place in cities.
2. Availability of natural and energy resources for the economic production within cities.

Evaluation of the cities sustainability is highly dependent on these two conditions. But these two only gives the theoretical framework for evaluation. To reach a rational conclusion an operational framework is required which can be given as below-

As a first step the variables involved in the ratio of negative environmental impacts/desired positive outcomes should be specified. They may be as following

–

**Positive out comes -**

- Gross product
- Added value
- Employment

**Negative Impacts -**

- Gas emissions
- Volume of waste
- Use of non-renewable energy resources

- Inputs of renewable natural resources

In next step, some absolute minimum levels of biological elements and processes in relation to human biological needs should be defined. The selection of these crucial minimum levels is a crucial issue and operational specification will depend on structure of area and features of natural environment in that area.

**Inferences:**

1. Environmental degradation has led to disturbance of ecological balance which has resulted in creating problems at various levels like global, regional and local.
2. Sustainability is a concept which has potential to address the environmental problem of the cities which have been created by the sole focus of the urban system to work as engines of economy.
3. There is intense concentration of human as well as natural resources in the city or urban settlements. These days concept of sustainability has become more important as natural resources are degrading and depleting due to some malpractices of the cities.
4. Sustainability requires a specific framework. The impacts on the natural environment must be considered along with the positive influence on the socioeconomic system.
5. As a result a relative evaluation context is to be adopted for assessing environmental sustainability of cities. And that relative evaluation should be restricted by the relevant absolute biological limits.
6. It can be inferred that to maintain safe biological limits in a city planning is the main tool which can help in by adopting environment oriented planning

practices where by conservation of natural resources, energy conservation & waste management should be given due priority.

**2. Bill Hopwood, Mary Mellor and Geoff O. Brien, 'Sustainable Development - Mapping Different Approaches' in Sustainable Development, vol-13, December, 2005.**

**Summary:**

Sustainable development is a very wide concept having different meanings which in turn provokes many responses. Broadly it deals with the concerns about environmental issues with socio-economic issues. There are no. of definitions available on the subjects suggesting variety of meanings. This paper presents a classification of different thoughts and their respective meanings. Author has expressed that although sustainable development has the potential to address fundamental challenges for humanity, now and into the future, however, to achieve this goal, it needs more clarity of meaning, concentrating on sustainable livelihoods and well-being. Especially, environmental sustainability requires a strong basis in principles that link the social and environmental issues to human equity.

Author has elaborated the various approaches to define sustainable development. Initially environment used to be treated as all together separate concept, completely out of the social and economic domain. The concept of sustainable development is the result of growing awareness of the global links between mounting environmental problems and socio-economic issues.

The most famous definition of the sustainable development was expressed in Brundtland Report (WCED,1987) as "meeting the needs of the present without compromising the ability of the future generations to meet their needs"



There are certain view points which strongly reject the concepts of sustainable development and sustainable growth. Like the one expressed by Daly (1993) that it is 'thought stopping concept' in a world where ecosystems are finite. Author has expressed bluntly that the concept of sustainable development is open to interpretation of being anything from almost meaningless to of extreme importance to humanity.

All the view points can be classified into three broad categories as following-

1. Status Quo
2. Reform
3. Transformation

Supporters of status quo recognize the need for change but see neither the environment nor society as facing problems. While supporters of reform approach accepts that there are mounting problems but do not consider that collapse in ecological and social system is likely. Transformationists argue that a transformation of society or human relations with environment is necessary to avoid a mounting crisis and even a possible future collapse.

**Inferences:**

1. Although there are no. of explanations of sustainable development but all proponents of sustainable development agree that society needs to change and adjust with environment.
2. Further confusion about sustainable development arises as people use the same words to mean a wide divergence of views on the goals, routes and the methods of moving towards sustainable development.

3. In present time, the sustainable development discourse is dominated by the managerial outlook where planning focusing on sustainability can be the first step to achieve ideal management.
4. The usual model for sustainable development is of three separate but connected spheres of environment, society and economy.

**Fig. – 2.1: Spheres of Sustainable Development**



5. The reality is that humanity is dependent on the environment, with society existing within, and dependent on, the environment, and the economy exists within society.
6. Humans live within the environment and depend on it for survival and well-being; hence we cannot ignore the environment and its importance.
7. Reform now is better than nothing and transformation may not be immediately feasible. Reform can be achieved at least in a settlement by proper planning strategies focusing on improving environmental conditions.
8. Urban sustainability is not a clearly defined, concrete objective to be reached by a certain deadline. It is an idea, a vision, to be used as a guide for sustained, multifaceted efforts over an indefinite period. It demands a long-term, comprehensive, and integrated perspective. For many people,

these are new and difficult ideas, and they constitute an approach to urban management that does not fit well with traditional political and administrative systems.

### **(3) REPORTS**

#### **1. Local Agenda 21 : UN Conference on Environment and Development (UNCED) June 1992**

##### **Introduction**

Agenda 21 addresses the pressing problems of today and also aims at preparing the world for the challenges of the next century. It reflects a global consensus and political commitment at the highest level on development and environment cooperation. Its successful implementation is first and foremost responsibility of Governments. National strategies, plans, policies and processes are crucial in achieving this. International cooperation is instrumental to support and supplement such national efforts. In this context, the United Nations system has a key role to play.

##### **The five steps in sustainable development planning**

###### **1) Partnerships:**

- Establish an organizational structure for planning by service providers and users.
- Establish a shared community vision

###### **2) Community-Based Issues Analysis:**

- Identify the issues that must be addressed to achieve the community vision.
- Do detailed assessments of priority problems and issues.

**3) Action Planning:**

- a. Agree on action goals
- b. Set targets and triggers
- c. Create strategies and commitments to achieve these targets, formalize into an action plan.

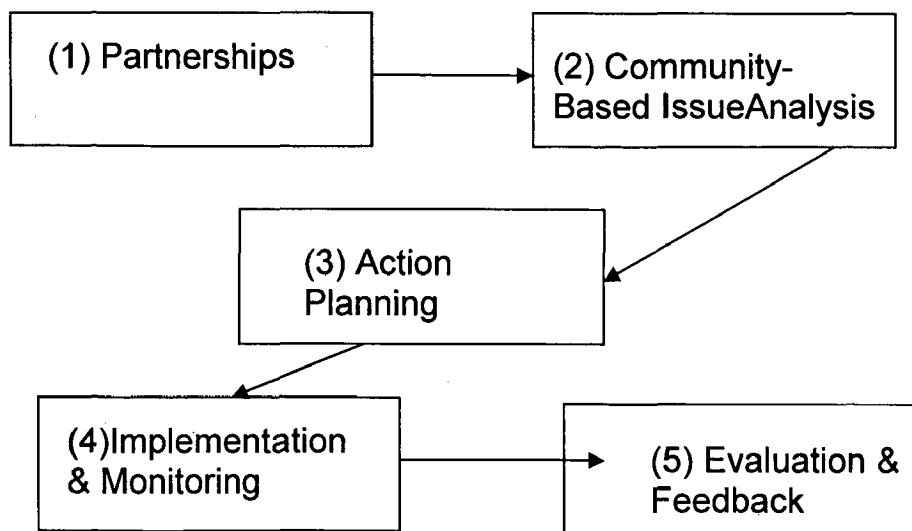
**4) Implementation & Monitoring:**

- a. Create partnership structures for implementing and managing systems for municipal compliance.
- b. Monitor activities and changes in services.

**5) Evaluation & Feedback:**

- a. Periodic evaluations using target-based indicators
- b. Results to service providers and users
- c. Repeat issues analysis and action planning at specified trigger thresholds
- d. Celebrate and reward achievements

**Fig. – 2.2: Five Steps in Sustainable Development Planning**



#### (4) UDPFI GUIDELINES

UDPFI Guidelines have suggested some norms and standards for the development of hill areas as following –

##### 1. Developed area average densities –

Settlement Type	Persons per hectare (pph)
a. Small Town	45 – 75
b. Medium Towns	60 – 90
c. Metro Cities	60 – 90

##### 2. Proposed Land use Structure in Hill Towns

Table – 2.1 : Proposed Land use Structure in Hill Towns

Land Use	Percentage of Developed Area		
	Small Towns	Medium Towns	Large Cities
Residential	50 – 55	48 – 52	45 - 50
Commercial	2 -3	2 – 3	4 – 5
Industrial	3 – 4	4 – 5	5 – 7
Public & Semi-Public	8 – 10	8 – 10	12 – 15
Recreational	15 – 18	15 – 18	16 – 20
Transport & Communication	5 – 6	5 – 6	6 – 8
Ecological	8 – 10	8 – 10	8 - 10

Source : UDPFI Guidelines

## 2. Physical Infrastructure

### Water Supply

Table – 2.2 : Water Supply Standards

Type	Size of Town		
	Small (<50,000)	Medium (>50,000)	Large and Metro (>10 lakh)
<b>a) Domestic</b>			
i) Absolute Min	70 lpcd	70- 100 lpcd	135 lpcd
ii) Desirable	100 lpcd	135 – 150 lpcd	150 – 200 lpcd
<b>b) Non Domestic</b>			
i) Fire Fighting	1% of the total demand		
ii) Public Purposes	10 – 15 lpcd	20 – 25 lpcd	30 – 35 lpcd

Source : UDPMI Guidelines

Table – 2.3 : Water Requirements for Institutional Buildings

S. No.	Institution	Litres per head per day
1.	Hospital	450 (per bed)
	a. No. of beds exceeding 100	
	b. No. of beds not exceeding 100	340 (per bed)
2.	Hotels	180 (per bed)
3.	Hostels	135
4.	Nurses homes & medical quarters	135

5.	ling ols/colleges	135
6.	Restaurants	70 (per seat)
7.	Airports & seaport	70
8.	Junction	70
9.	Terminal stations	45
10.	Intermediate stations	45
11.	Day school/colleges	45
12.	Offices	45
13.	Factories	45
14.	Cinema, concert halls and theatres	15

Source : UDPMI Guidelines

### Sewerage

1. The sewerage is estimated at the rate of 80% of the water supply in any area.
2. The large and metro cities shall be provided with regular sewerage treatment facilities at zonal/city level.

### Solid Waste Disposal

The production of solid waste in an urban centre is a function of the socio-economic profile of the population and activities in the area. The generation of waste varies from about over a quarter of kilogram in small towns to about half a kilogram per capita in large and metro cities.

# **CHAPTER - 3**

## **CASE STUDY**

**3.1 Preamble**

**3.2 A brief historical account**

**3.3 Present day, Mussoorie**

**3.4 Major problems in physical development of the town**

**3.5 Detailed study on various aspects**

**3.6 Planning concepts**

**3.7 Inferences**



### 3. CASE STUDY

#### 3.1 PREAMBLE

Mussoorie being the famous tourist hill town of Uttaranchal presents a similar context to Shimla. Mussoorie is also suffering from the increasing population pressure on its resources and infrastructure. Various strategies were adopted by the authorities in Mussoorie to achieve balanced development. These strategies of the Mussoorie town have been studied in detail so as to understand the solutions to problems posed by the prevailing conditions of the town. Therefore, Mussoorie town was selected for the case study purpose.

Mussoorie is a sub tehsil headquarter which comes under district Dehradun of Uttaranchal State. Mussoorie was discovered by a Captain Young in 1823. This tiny wooded inhabitation fast turned into a Victorian resort, with its central Mall, a library and a Church.

Initially Mussoorie was developed as a nursing home for military. With the developmental activities and beautiful hilly setting converted it into a famous tourist resort. In 1901 it had population of only 4700, which grew to 59000 in 2001.

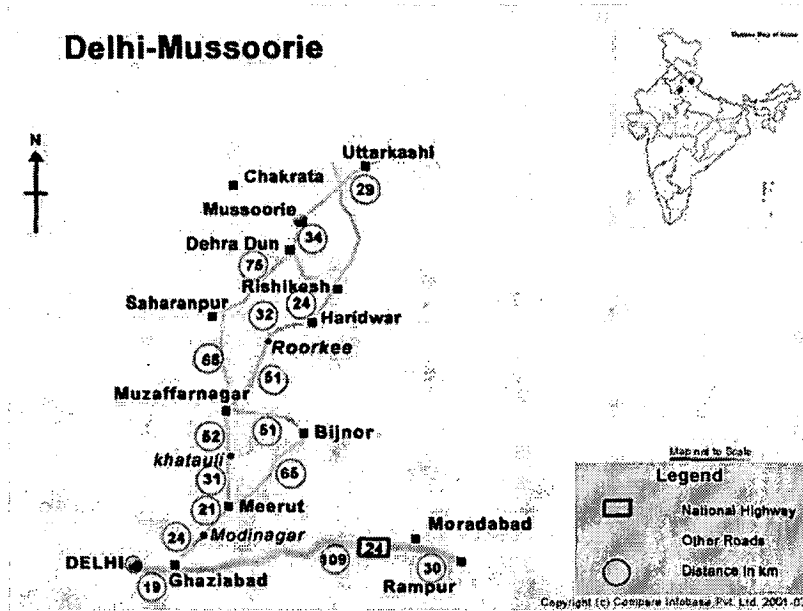
At present due to its environment, scenic beauty and geographical setting, it is not only a state tourism point but has attained the status of national and international tourist destination.

**a) Location** – It is located 34 km. north of the Dehradun. Mussoorie is perched at a height of 2000m along a 15 km ridge and is the closest hill station to the capital city of New Delhi.

Latitude - 30<sup>0</sup> to 30<sup>0</sup>-8' north

Longitude –  $78^{\circ}$ -25' to  $78^{\circ}$ -30'

Fig. - 3.1 : Location map of Mussoorie



Source : Department of Tourism Utteranchal

### b) Climate

Climate Mussoorie is pleasant in summers with day temperatures hovering around  $30^{\circ}\text{C}$  and nights getting chilly. Winter brings snowfall and rain, especially in December. Night temperatures dip down to near zero and days are cold at about  $7^{\circ}\text{C}$ . Mussoorie also gets monsoon showers between end of June and September.

- Average minimum and max temperature varies between  $5^{\circ}\text{C}$  to  $25^{\circ}\text{C}$
- Average Annual rainfall – 176.80 cm.
- Wind direction – South –Southwest to North – Northeast.

### c) Topography

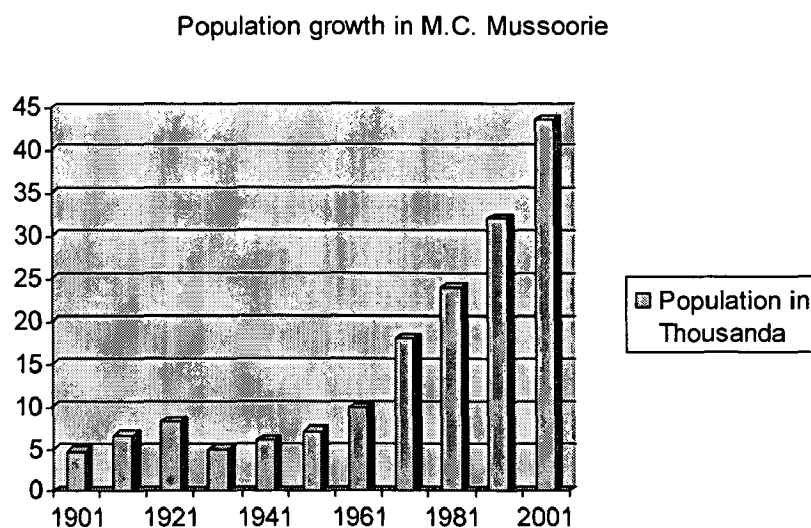
Mussoorie is mountainous region. Because of this reason planning in such an area becomes a challenging job.

d) Area – 17571.20 Hectares

### e) Population

Planning area Mussoorie comprises Mussoorie town and 12 villages. At present 81% of the population and 36.85% area is in Mussoorie town.

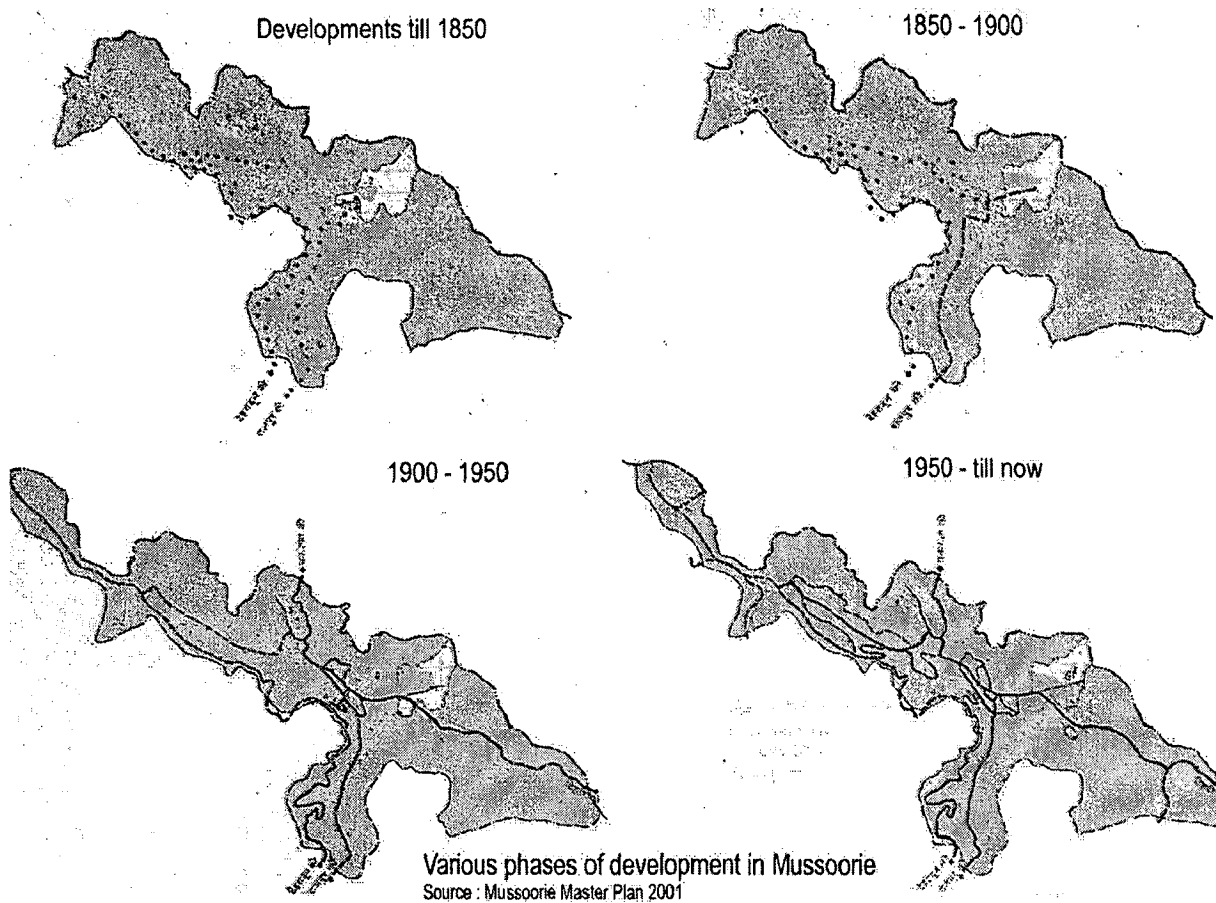
**Fig. - 3.2 : Decadal Population Growth**



- Population (Planning Area) – 59690
- Sex Ratio – 847f/1000m
- Average Family size – 4.5
- % of working population – 35%
- Literacy rate – 64.55%
- Male literacy – 70.56%
- Female literacy – 55.28% Source

### 3.2 A BRIEF HISTORICAL ACCOUNT

During eighteenth century it was part of Gharwal state. In 1803 it was taken over by Gorkha Empire. It became part of the British India in 1815. Massoorie as a town and tourist spot was discovered by then police superintendent, J.F. Shore and his friend captain Young in 1823. In 1826 captain Young constructed "The Malingar" a residential house. After that Massoorie became a famous tourist spot

**Fig. – 3.3: Various Phases of Development of Mussoorie Town**

for British officers. Shortly after the construction of “The Malingar”, a sanatorium was opened in Landaur area for British Soldiers. In this way, earlier it served as a nursing home and later it became famous as tourist spot. All these events helped Mussoorie to pick pace in developmental activities. Development of Mussoorie town can be summarized as shown in fig. – 3.3

### 3.3 PRESENT DAY, MUSSOORIE

Right from 1948, various estates became major charm for business men and rich people. The process of buying, selling and sub-dividing gave further momentum to the construction activities in Mussoorie which only increased the defacing process in the city. Establishment of Indian Academy of Administration and rehabilitation of Tibetians in Happy Valley greatly increased the construction activities. It is a notable point that Mussoorie not only provides services and

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facilities to the native population but it is a major centre of community facilities for the adjacent rural areas. But all those community facilities have just concentrated in certain pockets of the town. Due to this, trees are cut in an uncontrolled manner just to establish residential colonies near the facilities. There is one more dimension to the plight of the city. Nearby areas of Mussoorie are famous for the availability of good quality lime stone, Gypsum and Pyrite, due to this mining of these minerals have resulted in the highly adverse effect on the physical development of the area. At present Mussoorie has become a main tourist place in northern India with ever increasing tourist population, which has resulted in continuously increasing pressure on the infrastructure facilities of the town. To streamline the developmental activities in Mussoorie master plan – 2001, outlined following objectives -

### **3.3.1 Main objective of the master plan**

1. To streamline, uncontrolled development activities within the Mussoorie town and villages which fall under planning area and to achieve balanced development in terms of physical, social and economic goals.
2. To find out the land availability in the planning area and decide various land uses considering the projected population.
3. To develop an effective and workable transportation strategy.
4. To prepare a practical strategy to conserve forest and water features/bodies of the planning area.
5. To prepare a comprehensive framework for the sustainable development of the planning area.

### **3.4 MAJOR PROBLEMS IN PHYSICAL DEVELOPMENT OF THE TOWN**

1. Steep slopes and dense forest area which is present to the north of the town is major obstacle in the development of the town in that direction.

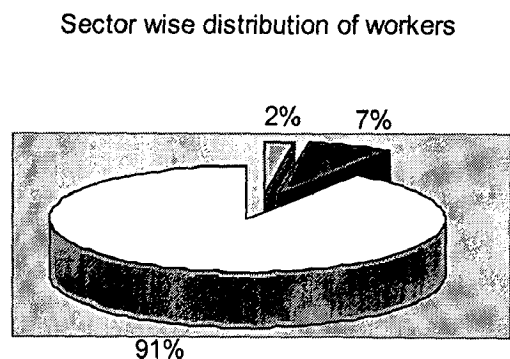
2. Even to the south there is already development and scenic view of the Doon Valley in this direction restricts the development in this area also.
3. There is only west direction available for the development of the town but steep slopes and forest area suggest only a thin development pattern.
4. There are mining activities present in the east and west of the town which are causing degradation of the nearby tourist spots and causing a great threat to the overall environment of the town.
5. Most of the present residential areas have become agglomeration of the all activities like official, commercial and industrial which is causing degradation of the residential areas. It has also increased unnecessary traffic in these areas.
6. Haphazard construction activities have spoiled various tourist spots.
7. The gap between no. of tourists and available facilities to cater to them is ever increasing.
8. There is an acute shortage of parking facilities in the town and there is an urgent need to make proper bus stands at various locations in the town.

### 3.5 DETAILED STUDY ON VARIOUS ASPECTS

#### 3.5.1 Economy

Development and population increase in any town is influenced by its economic base. After studying the economic features of the Mussoorie, it can be concluded that Mussoorie is basically a services town. According to the town & country planning

Fig. - 3.4 : Sector wise Distribution of Workers



■ Primary Sector ■ Secondary Sector □ Tertiary Sector

departmental survey, 90% of the workers are working in fields of service industry like business, transportation and other tourism related services.

Total working population – 15225

### 3.5.1.1 Types of shops

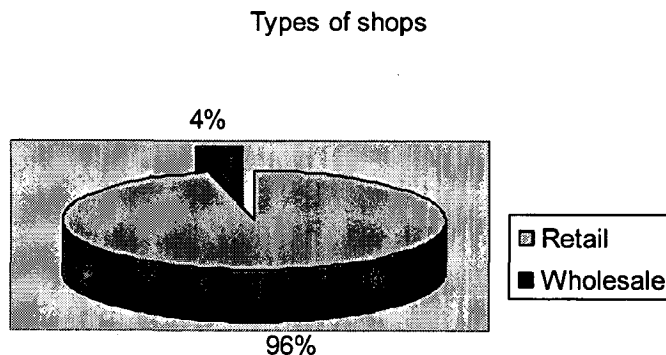
There are following types of the commercial activities in the town-

Food & Grocery shops – 45%

Service shops – 21%

Others – 24%

**Fig. - 3.5 : Types of Shops in Mussoorie**



Source : Mussoorie Master Plan, 2001

### 3.5.1.2 Industries

Industrial activities play a very vital role in the physical and economic development of the town. But Mussoorie can be termed as exception considering this fact. There are no industries worth mentioning in the town. At present there are only cottage or small scale industries in the town, that too are very less. (appx. 39 in numbers). These are mainly related to dairy, bakery, shoe making and wooden articles.

### 3.5.1.3 Strategy adopted for industrial development

Main points of the strategy are as following –

1. Proposal was given to develop Mussoorie and nearby areas as a centre of small scale industries.
2. Cottage industries will be given all possible help for further development.
3. Only pollution free industries like electronics, watch, chemical and pharmaceutical industries will be developed in an area specially delineated for the purpose which was app. 3.1 hectares.
4. It was proposed to make it mandatory to plant trees on 30% of open areas in industrial complexes.

#### **3.5.1.4 Strategy related to trade & commerce development**

It was proposed that whole business and commerce activities of the town should be developed in four main centres as-

1. Main Business District
2. Sub – Business district
3. Retail business centre
4. Wholesale and storage.

Main business district centre of the town will be only one which included the existing developed area in terms of business activities. There would be a sub district centre for every 10-15 thousand population. Retail markets will be developed for every 2500-5000 population.

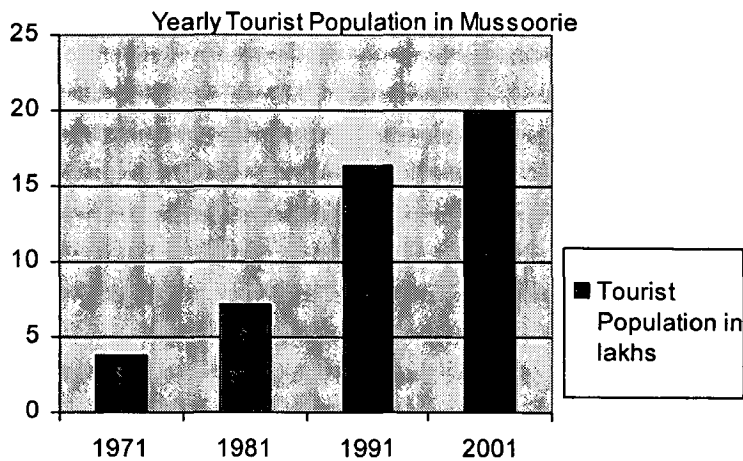
#### **3.5.2 Tourism**

As we know that development of the Mussoorie town was basically for tourism only. So even at present economy of the town rests on tourism and its related activities. Tourism is the only reason why Mussoorie is known not only at national level but it has gained fame at international level also. But for last few years tourism has become one of the main factors which is exerting too much pressure



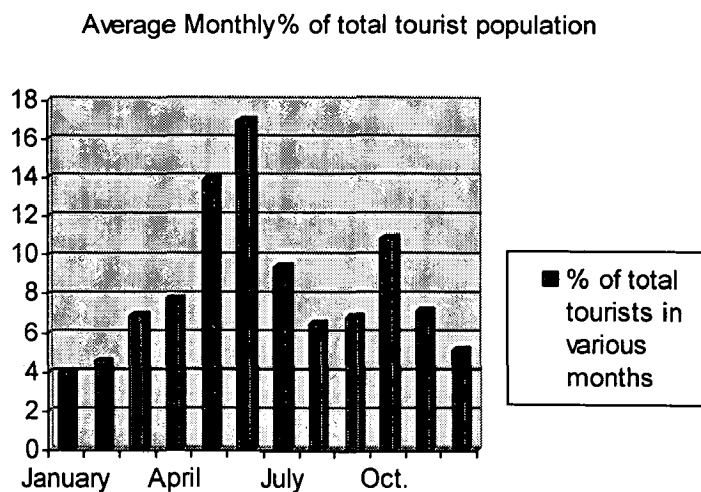
on the hill town. Day by day increasing no. of tourists and tourism activities are cause of concern. This town is not able to meet the demand of the increasing no. of the tourists due to the lack of facilities and infrastructure. There is an annual increase of 6.43% of tourist population.

**Fig. - 3.6 : Yearly Tourist Population in Mussoorie**



Source : Mussoorie Master Plan, 2001

**Fig. - 3.7 : Average Monthly % of total tourist population**



Source : Mussoorie Master Plan, 2001

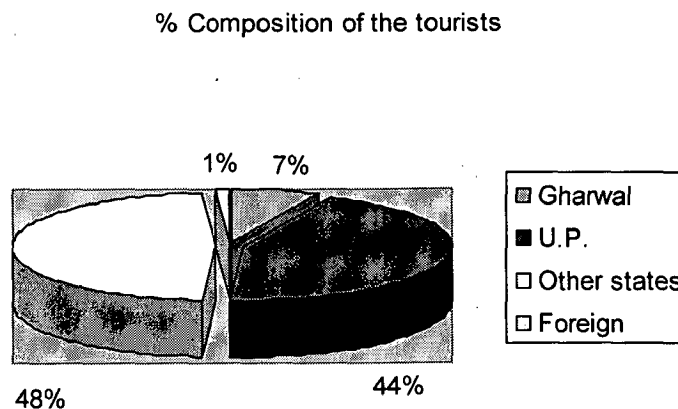
This unprecedented growth of tourists helped in increasing the income level of the native population, but simultaneously resulted in exerting too much pressure on residential, commercial, transportation, and infrastructure of the hill town. As a

result haphazard construction activities picked a new growth trend to cater to the increasing needs of the tourists.

Analysis of the last 12 years of the tourist data show that max. percentage of the tourist come in May and June followed by October – November as shown in fig -.

### 3.5.2.1 Tourist Type

Fig. - 3.8: % Composition of Tourists



Source : Mussoorie Master Plan, 2001

After a survey conducted by town and country planning department, this was established that there are 7% and 44% of the tourists which come from Gharwal and U.P. rest 48% tourists are from other states of India and Foreign tourists are only 1%

### 3.5.2.2 Main areas of concern

At present there are provision of 7000 beds in various hotels, lodges, guest houses and Dharamshalas and out of these 10% are of very bad condition or of very low standard, which is very less considering the average daily flow of tourists i.e. 9000. So accommodation facilities are only serving 70% of the tourist population. Other concerns were as following\_

- Degradation of already existing tourist spots.

- 
- Lack of facilities in and around existing tourist spots.
  - Pollution at almost all main tourist spots.

### **3.5.2.3 Strategy adopted for tourism development**

1. It was proposed that Mussoorie should not be a tourist place for just few months. So emphasis was given to develop various new tourist destinations and to increase the level of facilities in and around already existing tourist spots.
2. Environment was given high priority in all tourism related projects. It was suggested the tourism related projects should not disturb ecological balance.
3. It was proposed that villages falling within the planning area should be developed as tourism villages maintaining their existing culture and character.
4. To revitalize tourism in Mussoorie town three main tourism complexes were proposed.
5. Total 92.75 hectare land was proposed for the tourism development.

### **3.5.3 Residential Development**

- It was proposed gross density of the any area should not exceed 150 persons per hectare (Table – 3.1). Even already developed areas will also be covered under this guideline.
- Areas of high slopes and rocky areas was proposed for low densities.
- Complete planning area was proposed to be developed for tree types of the residential densities as shown above.

**Table – 3.1 : Proposed population densities**

S. No.	Proposed population density	% of population	Area in hectares
1.	50	40%	250
2.	51- 100	45%	123
3.	101 – 150	15	35

Source : Mussoorie Master Plan 2001

### 3.5.4 Physical Infrastructure

Physical and social infrastructure forms the backbone of any urban development. This point was very well taken into consideration and accordingly proposals were given for various facilities.

#### i) Water Supply

At present Mussoorie is getting 120 lpcd water for its population. But with increasing population it has become extremely essential to explore new water sources to meet the future water demand of the town. For this purpose Aglad river has been identified as potential water source for the future. Simultaneously it was proposed that already existing water resources should be conserved and maintained properly. In future it was estimated that water at the rate of 150 lpcd would be available if Aglad river is used as a future water source.

#### ii) Sewerage

Mussoorie was one of the first towns to start sewerage system in India. Present sewer system was installed in 1916. At present there is 15 km long sewer line in the town. Proposal was given to phase wise replace the old sewer lines and connect newly developed areas to sewer systems.

#### iii) Electricity

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There is 100% electrification in the Mussoorie planning area. But considering the increasing population a 133kv power station was proposed to cater to the future needs of the town.

### **3.5.5 Social Infrastructure**

#### **i) Education**

After tourism, education and its related activities are the main stays of the town.

Status of educational institutes present in the town are as following-

1. Postgraduate college – 01
2. Intermediate colleges – 15
3. Junior High Schools- 08
4. Primary Schools – 21

30% of the educational institutes are residential schools and 60% of the total students study in these residential schools. Proposal was given to increase the total no. of the institutes in proportion to the increasing population.

#### **ii) Health**

At present there are total 271 hospital bed available which makes them to the one bed per 220 persons which is adequate considering the standards. But main problem is related with staff and facilities in the health institutions. So it was proposed to strengthen existing health infrastructure.

#### **iii) Community facilities**

Although there are no. of community facilities in terms of community halls, libraries, recreational clubs, and open spaces but there no. needs to be increased considering the population increase.

### **3.5.6 Ecology**

Ecology of the area is of utmost importance for the overall well being of its inhabitants. Due to lot of mining activities in the area, many areas became highly

sensitive and sliding of rocks was also observed in some areas. Some of the points which were highlighted in the master plan related to ecology are as following -

1. Construction was banned in ecologically sensitive areas.
2. Conservation of forests and water bodies was given due importance.
3. Quarrying was banned in the areas considering the long term bad effects.

### 3.6 PLANNING CONCEPTS

Four main options were considered for the development which are as following –

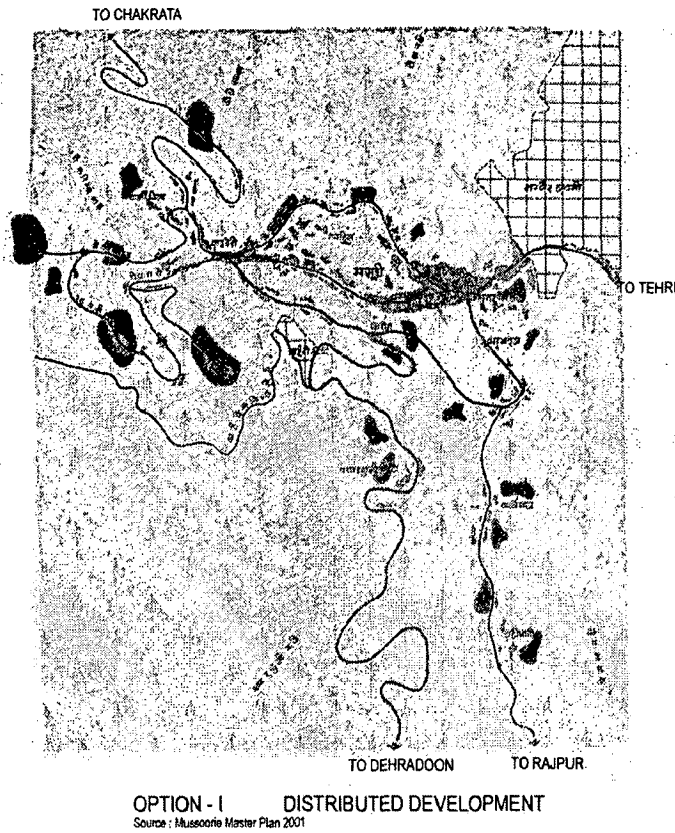
1. Distributed development
2. Saturated Development
3. Dense Development
4. Multiple centre approach

After thoroughly considering the various options and their merits and demerits it was decided that multiple centre approach would be ideal as well practical considering the context of the town. Following this concept four centers were proposed as following –

- i) Present town center will act as a main centre.
- ii) Two sub centres were proposed in west direction at Happy Valley and Vincent hill
- iii) In south there will be one sub - centre at Jharipani and Barloganj.



**Fig. – 3.9: Application of Distributed development concept in Mussoorie**



**Fig. – 3.10: Application of Consolidated development concept in Mussoorie**

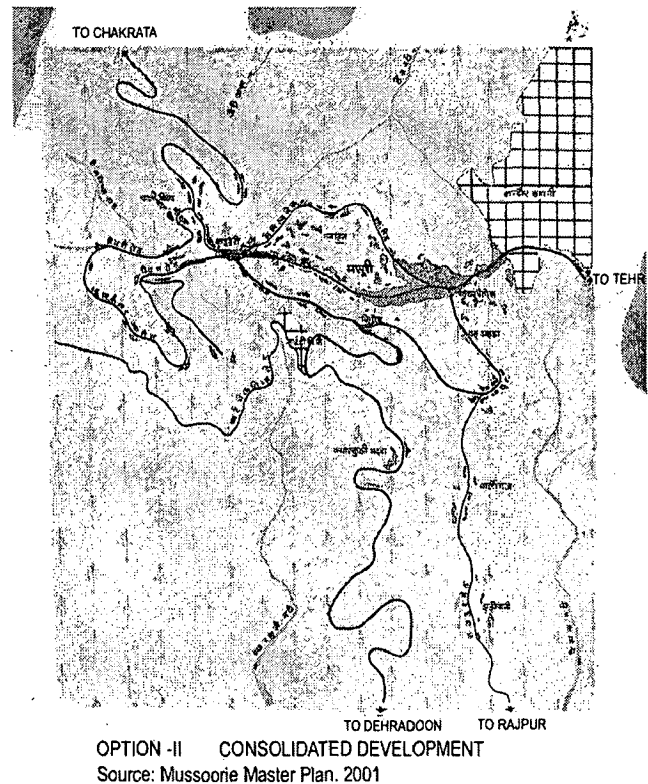


Fig. – 3.11: Application of Dense development concept in Mussoorie

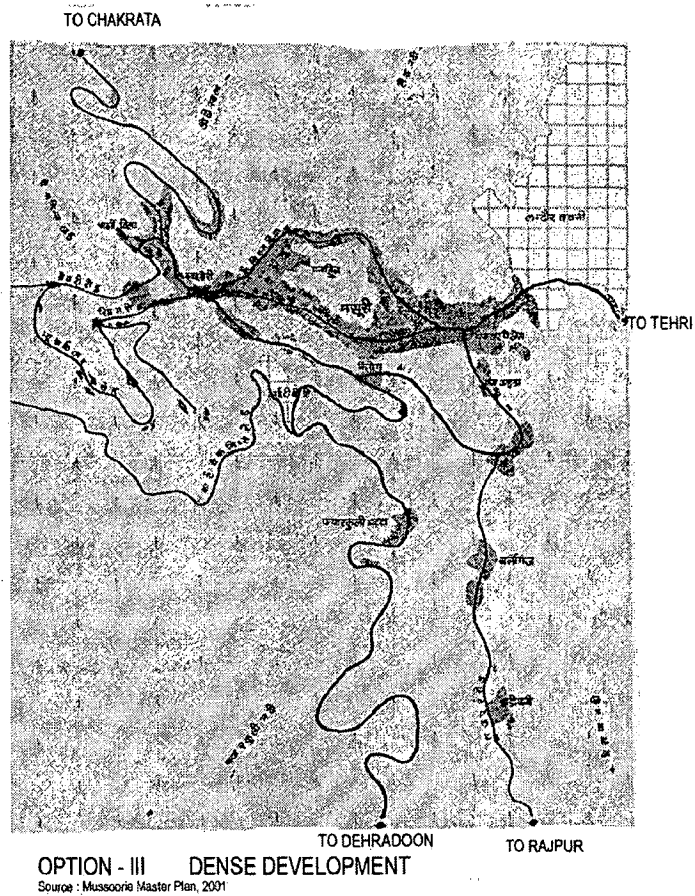
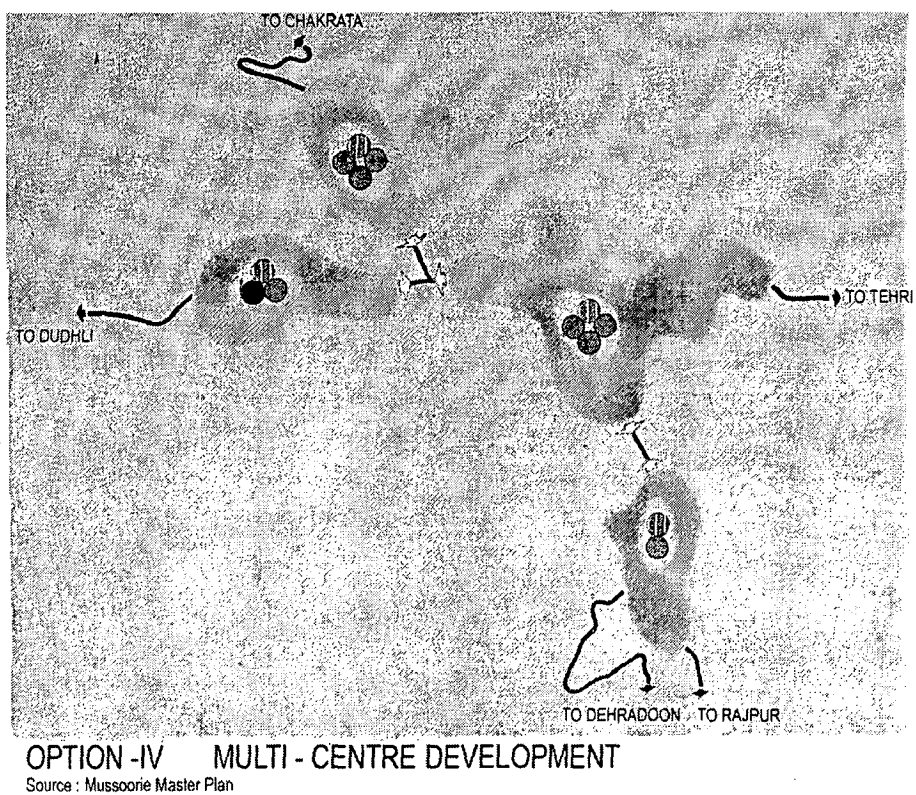


Fig. – 3.12: Application of Multi-Centre development concept in Mussoorie



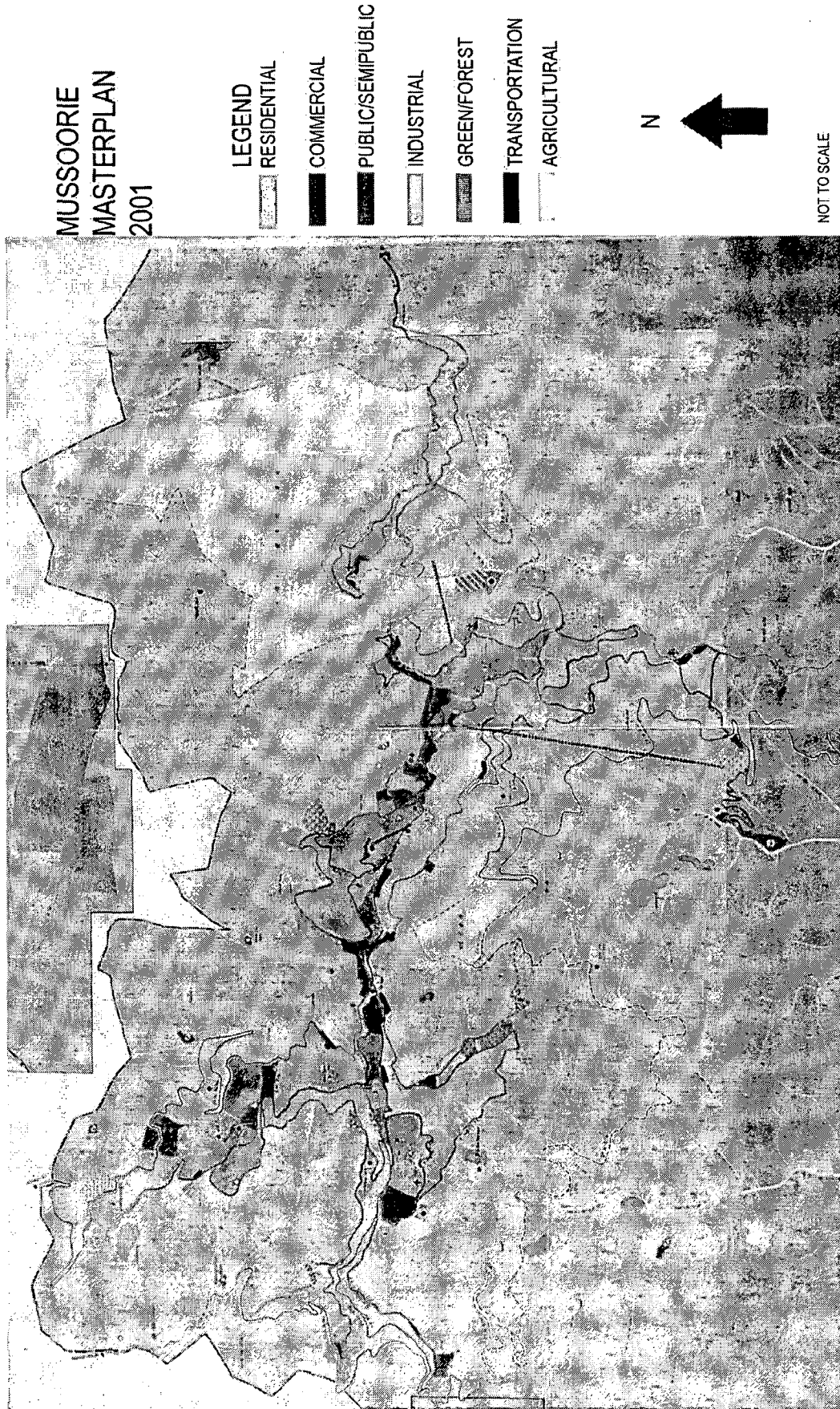


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**3.6.1 Main objectives of the concept followed –**

1. To achieve decentralized physical planning in the planning area so that population density is distributed throughout the town.
2. Neglected areas of the town to be included in future planning process.
3. To promote development in relatively flat areas and forest less areas.
4. To protect and further develop the main tourist areas in and around the town.
5. To protect steep slopes of the town.
6. To protect and develop water resources of the town.

Map – 3.1: Proposed Landuse 2001, Mussoorie



Source : Mussoorie Master Plan, 2001

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### 3.7 INFERENCES FROM CASE STUDY

1. A place like Mussoorie which solely developed for tourism purpose, should maintain its character of natural beauty, good environment and serenity. If that character of the town is not maintained, it will turn out to be a dangerous bargain in long run which will not only imbalance the economy of the town but will result into a complete disaster to the town.
2. Environmental consideration and ecological balance should be given utmost priority while planning in a hill town. There should be strict ban on the activities which are harmful to the ecology of the region as mining in case of Mussoorie.
3. Two pronged approach should be adopted for the development in hills where by rejuvenation of the older parts of the city should take place simultaneously with the new development programmes.
4. Preservation of the forests, water bodies and other tourist attractions should be the prime agenda of the planning processes of the town and its vicinity.
5. Infrastructure should be adequately planned and provided considering native as well as floating population of the town otherwise poorly planned and managed infrastructure will further add to the misery of the town.
6. There should be strict zoning regulation in the towns of tourist importance other wise commercial forces will encroach upon other landuses of the town which will lead to a complete mess of the various uses.
7. Encroachments on roads and public places should be dealt with ruthlessly and adequate road widths should be maintained considering traffic volumes of the respective areas.
8. All possible options of the planning concepts should be explored, analysed thoroughly considering the context and then a suitable option should be adopted considering the long term development of the town.



# **CHAPTER - 4**

## **ANALYSIS OF STUDY AREA**

**4.1 Introduction**

**4.2 Geographical setting**

**4.3 Geology**

**4.4 Climate**

**4.5 Regional scenario**

**4.6 City functions**

**4.7 Planning area**

**4.8 Demographic profile**

**4.9 Inferences**

## 4. ANALYSIS OF STUDY AREA

### 4.1 INTRODUCTION

Shimla, prior to its development as a hill station was described as an “obscure village”. The village was named ‘Shimla’ after the temple of Goddess Shyamala located in the village.

Shimla was discovered by the British in 1819, and became favourite destination of British officials in summer as a hill station and convalescent centre. Shimla was declared the summer capital of Indian Government in 1864.

Amidst the Central Himalayas, it is a charming hill resort for tourists from all over the globe. Established by the British on hill top, with unique urban design, it is known as ‘Queen of Hill Stations’. During recent decades, after acquiring the status of state capital of Himachal Pradesh, it emerged as a major cultural, educational and institutional centre.

**Table - 4.1 : History of Shimla City**

S.N	Period	Function of Town	Population
1	Till 1830	Village	
2	1830-1850	Holiday Resort for Britishers	320 (1842)
3	1850-1910	Summer Capital of Punjab	13960 (1901) 19405 (1911)
4	1910-1947	Summer Capital of British Empire	18348 (1951)
5	1951-1971	District Head Quarters	42597 (1961)
6	1971-1981	Capital of Himachal Pradesh	55326 (1971)
7	1981-Till Date	--do--	109860 (1991)

Source : City Development Plan 2006

In 1850, the Punjab Government decided to use Shimla as its summer capital. After partition in 1947, the officers of Punjab Government were shifted from Lahore to Shimla. In 1966, with reorganization of territory into Punjab, Haryana and Himachal Pradesh, Shimla became capital of Himachal Pradesh and on 25 January, 1971, it was given complete statehood. Chronological history of the functions of the town is given in table no.- 4.1

#### **4.2 GEOGRAPHICAL SETTING**

Shimla District is a part of Northwestern Himalayan Agro climatic region of Himachal Pradesh. It is located in the North-East region of Himachal Pradesh. Shimla is situated in Central Himalayas, south of the river Sutlej at 31° 4' North to 31° 10' North Latitude and 77° 5' East to 77° 15' East at an attitude of 2130 meters above mean sea level.

#### **4.3 GEOLOGY**

Shimla city is situated on the rocks of Jutogh Group and Shimla Group. These comprises earlier Chail Formation and Shimla Series represented by shale, slate, quartzite and local conglomerate.

#### **4.4 CLIMATE**

Increasing heat in summers, declining quantum of snow in winters, unusual behavior of monsoon and frequent dry spells are the prime climatic concerns in Shimla, which has been observed in past few years. Haphazard growth has resulted in climatic changes. Summer temperature has started increasing and in winter snow fall is not sure in every winter season. These days, highest temperature during summer months of May-June goes even more than 30° C.

##### **Summer Temperatures**

Average Max. Temperature - 30°C

Average Mim. Temperature - 15°C

### Winter Temperatures

Average Max. Temperature – 10 °C

Average Mim. Temperature - 0°C

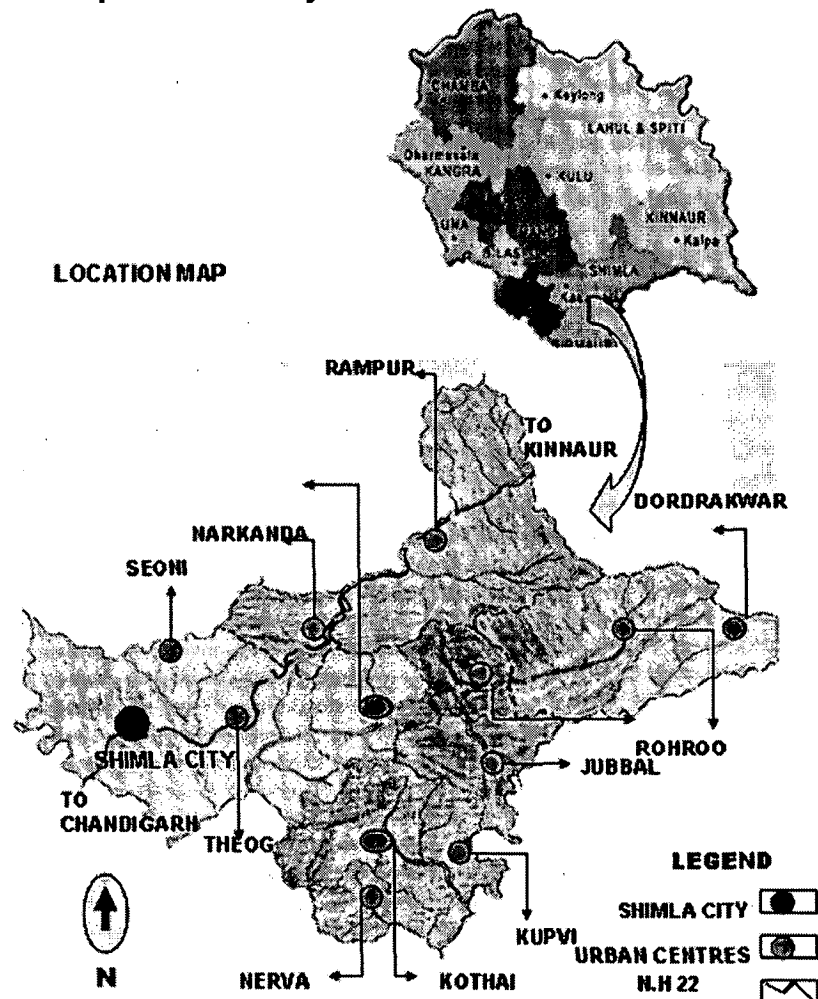
Average Annual Rainfall of Shimla – 1660 mm

Wind Direction - South –Southeast to North – Northwest.

## 4.5 REGIONAL SCENARIO

Shimla was established primarily as a tourist-cum-administrative town. It is now vibrating with multifarious activities like trade, commerce, tourism, education, health, institutions, Govt. offices etc. Besides the Capital of Himachal Pradesh it has to cater to the requirements of the entire State.

Fig. – 4.1: Location Map of Shimla City



Source: Draft IDP Shimla - 2006



Shimla is known for its scenic beauty, simple and benevolent behaviour of people and pollution free pleasant climate. Shimla is district headquarter of Shimla District. It forms its immediate region (fig.-4.1) According to 2001 census, population of District Shimla is 7,21,745 persons, which is 11.88% of total population of the state. Population of region is expected to grow at the rate of 25% per decade, primarily due to increase in horticulture activities. Part of population, is therefore, likely to migrate to nearest urban centres to seek employment and basic amenities. Shimla being most important regional centre and preferred destination in this resource region, is likely to witness an unforeseen pressure of population.

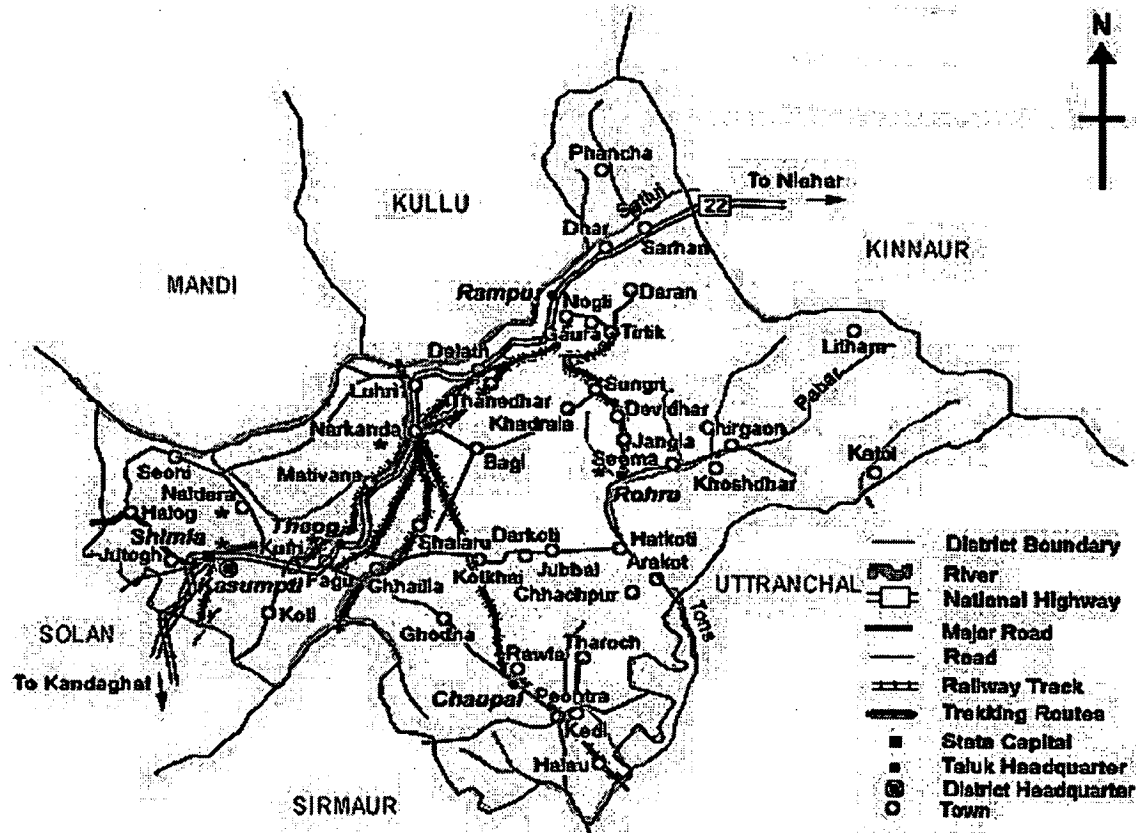
#### **4.5.1 Regional resources**

Agriculture and Horticulture are the mainstays of economy of this region. However, as compared to its geographical area of 4,80,058 hectares, only 1,81,139 hectares which works out to 37.7 percent is the total cropped area. It has 68,784 hectares forested area. The geo-climatic features of this region are very much congenial for the development of horticultural pursuits specially the temperate fruits. During recent years, the horticulture has become a prime mover of economy of this region. A shift from the agriculture to horticulture has revolutionized the economic conditions of people. This has led to commercialization, industrialization, marketing and urbanization. The production of apple has become major source of income which was 376.73 thousand tones during the year 2000-2001. It is anticipated that Shimla will continue to act as a major collection and distribution centre with fast increasing production of fruits and cash crops in its hinterland.

#### 4.5.2 Regional linkages

Shimla is well connected by road, rail and air. Shimla is connected by road with Delhi (30km), Chandigarh (117km). Shimla is connected by narrow gauge railway line from Kalka (90km). Shimla airport at Jubbarhatti, 23km from city is connected to Chandigarh, Kullu and Delhi.

Fig. - 4.2:Regional Linkages of Shimla City



Source: HPTDC

#### 4.6 CITY FUNCTIONS

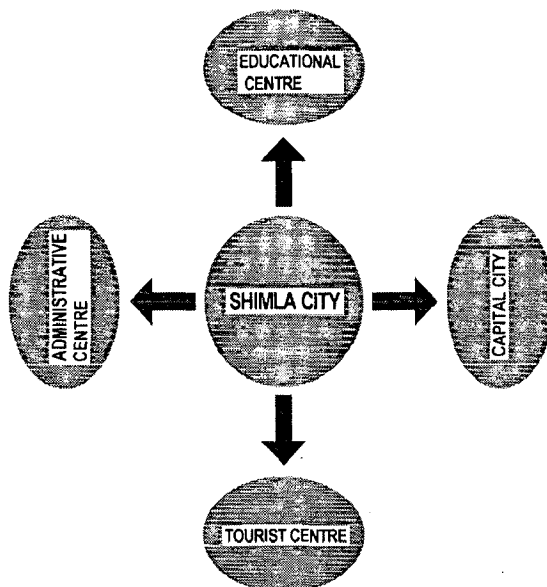
As per 2001 census, Shimla is the only Class I town in the entire state of Himachal Pradesh with majority of town falling under Class IV category. This explains the dominance of the town in the State in terms of facilities, amenities and opportunities.

Shimla, is a multifunctional city along with dominance of tourism, administration and institutional activities. The multifunctional activities are putting heavy stress

on development activities leading to unregulated development and congestion in core area. The various functions which city is performing today are as shown in fig.- 4.3

**Fig. - 4.3: Functions of Shimla City**

- a) Capital Functions
- b) Administrative Centre
- c) Education Centre
- d) Tourist Centre



#### 4.7 PLANNING AREA

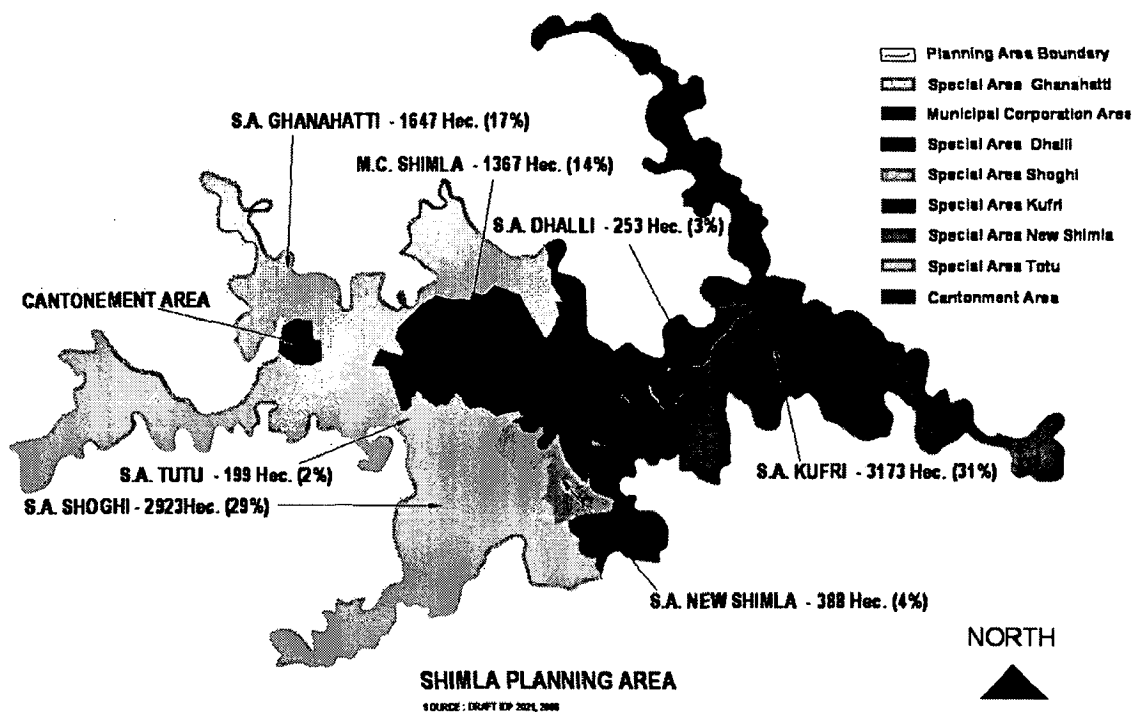
The 9950 Hectares of total area including, Municipal Corporation, Shimla, Special Areas of Kufri , Shoghi ,Totu, New Shimla Kasumpti , Dhalli and Ghanahatti, is notified planning areas.

**Table - 4.2: Settlements Falling Within Planning Area**

Settlement	Area in Hectare	% age
M.C. Shimla	1367	14.00
S.A Ghanahatti	1647	17.00
S.A Kufri	3173	31.00
SA Dhalli	253	3
SA Shoghi	2923	29
SA Tutu	199	2
SA New Shimla	388	4

Source: Town & Country Planning Department

Fig. – 4.4: Constituent Areas of Shimla Planning Area

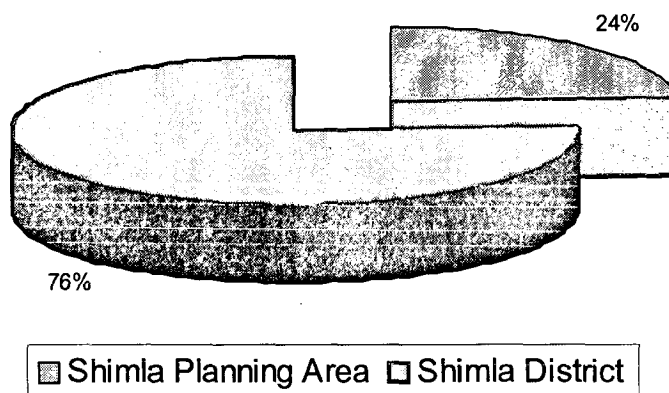


Source: Town & Country Planning Department

#### 4.8 DEMOGRAPHIC PROFILE

The development of a particular city, town or a region depends upon natural, physical and socio-economic factors. Among these factors the population assumes significance in determining the future pattern of progress and development.

Shimla Planning Area (SPA), the only Class I city in the Himachal Pradesh, has a population of 1,74,789 persons (2001 census), which accounts for 24% population of the Shimla district. The population of SPA has increased from 1,29,827 persons in 1991 to 1,74,789 in 2001, recording a decadal growth rate of 34.63 percent. During the past few decades, the city's population has grown at a faster pace than the corresponding state average. The settlement-wise description of population as per 2001 Census is presented in Table 4.3.

**Fig. - 4.5: Proportion of Population of Shimla Planning Area**

Source: Census of India ,2001.

#### 4.8.1 Population growth

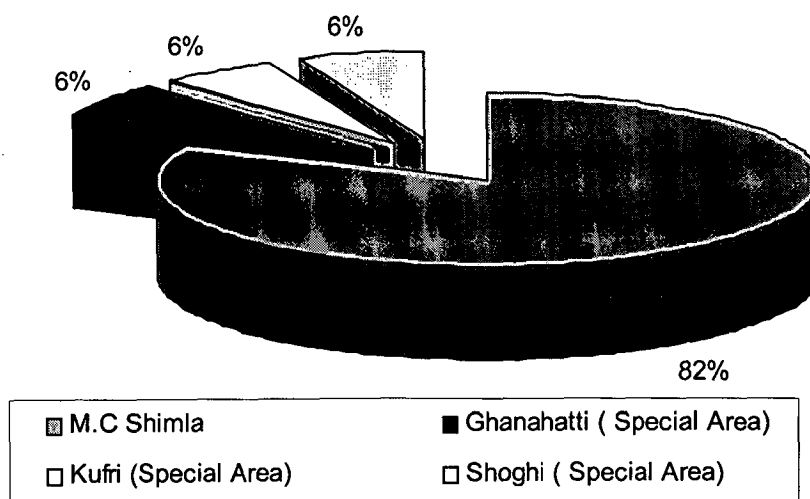
The settlement-wise description of population as per 2001 Census is shown in table no. - 4.3 under:

**Table - 4.3: Population of Shimla Planning Area 2001**

Settlement	No. of Households	Total Persons	Male	Female
M.C. Shimla including Totu, New Shimla & Dhalli Special Areas	37756	142555	81,186	61369
Ghanahatti Special Area	2651	10185	5839	4346
Kufri Special Area	2426	10720	5925	4795
Shoghi Special Area	2330	11329	5954	5375
<b>Total</b>	<b>45163</b>	<b>174789</b>	<b>98,904</b>	<b>75885</b>

Source: Census of India ,2001.

Fig. - 4.6: Settlement-wise Population Dis



Source: Census of India, 2001

About 82% of whole population of Planning Area lives in Municipal Corporation, Shimla including three Special Areas namely, Dhalli, Tutu and New Shimla Special Areas. As per the Census 2001, special areas of Dhalli, Tutu and New Shimla were part of Municipal Corporation and presently under Special Areas having a total population of 13.83 % of the total population of Municipal Corporation. Besides, 12% population of total Planning Area lives in Kufri and Shoghi Special Areas and 6 % population lives in newly constituted Ghanahatti Special Area (fig.-4.6).

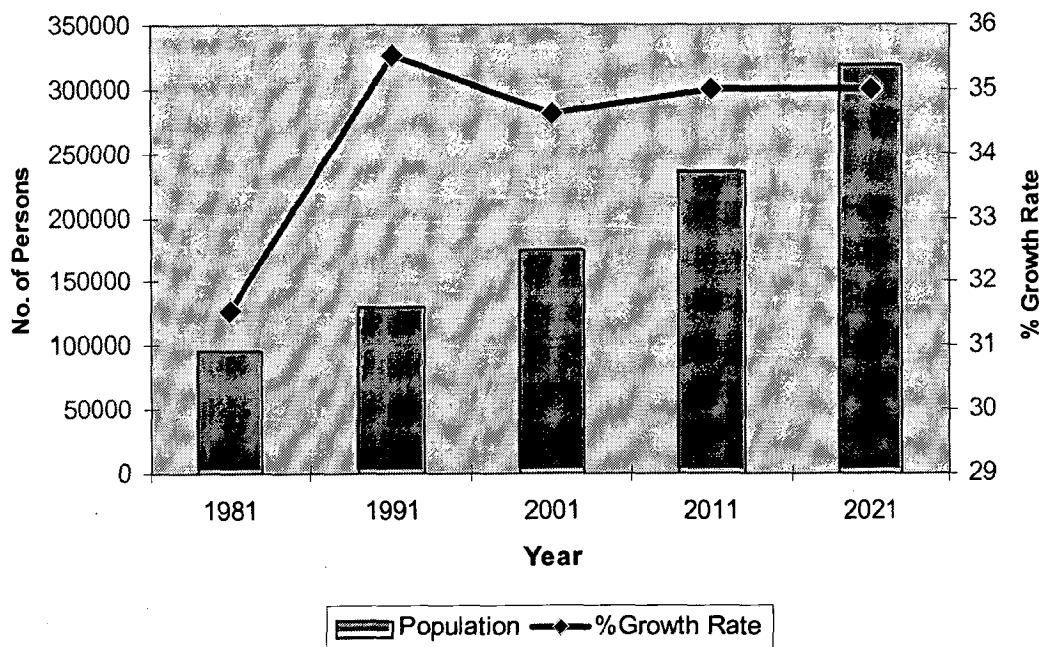
Table - 4.4: Decadal Population Growth

Year	Persons	Decadal Variation	% Age Decadal Growth Rate
1971	72870	-----	-----
1981	95851	22981	31.54
1991	129827	33976	35.54
2001	174789	44962	34.63

Source: Census of India, 2001

Decadal population growth has been above 30% for last few decades & for last two decades, it has been around 35% (Table – 4.4 & fig.-4.7)

**Fig. - 4.7: Decadal Population Growth**



Source: Census of India, 2001

**4.8.2 Floating population**

It has been observed as per Census analysis that the floating population growth rate has observed a little downward trend in the city except for the decade 1991 to 2001.

**Table - 4.5: Floating Population**

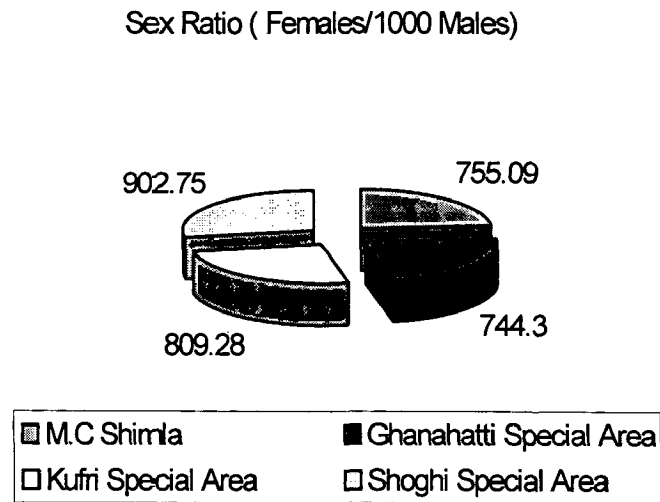
Year	Floating Population	% Age Decadal Growth Rate
1971	23459	36.00
1981	30000	31.74
1991	40000	31.70
2001	56000	40.00

Source: Census of India

### 4.8.3 Sex ratio

In Shimla Planning Area for every 1000 males, there are 767.25 females. The District has, however, 896.35 females per 1000 males.

Fig. - 4.8: Sex Ratio



Source: Census of India, 2001

Out of 1,74789 total population, 98904 are males and 75885 females. Being a service city males are involved in service sector and majority of them keep their families at their native places. Number of females per 1000 males vary within Shimla Planning area. As per analysis the settlement-wise description of sex ratio as shown in fig.-4.8.

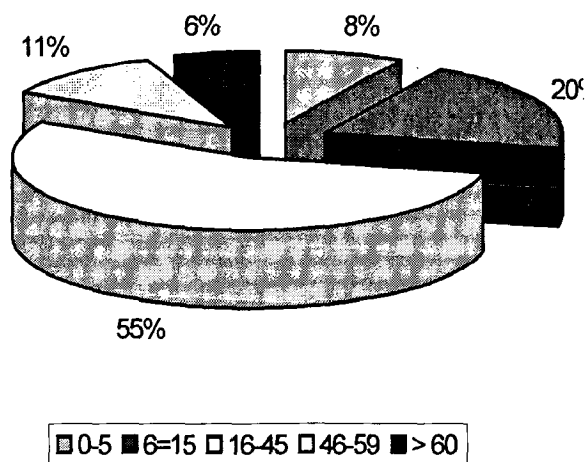
### 4.8.4 Age-composition

8% population is below 5 year age, requiring mother care nurseries and tot lots. The 20 % population is in the age group of 6-15 years requiring provision for schooling and recreation. The 55 % population is in the age group of 16-45 years, which require facilities for higher learning like Senior Secondary Schools, Colleges, Industrial Training Institutions, Professional Colleges including Information Technology, Computer Applications, Management, Engineering and Medical. This reproductive age group has to be provided with family planning and post /pre-natal health care services. The 5.81 % population is 60 years and



above age group, implying that most of these people may be leading a retired life in old age. For this age group, provisions are to be made for old age homes and passive recreational facilities.

**Fig. - 4.9: Age Composition**



Source: Census of India, 2001

#### 4.8.5 Educational status

Shimla being a Capital city and traditional educational centre since British days, there are number of educational institutions namely University, Colleges, Senior Secondary, High, Middle and Primary schools. Therefore, Literacy Rate is high in Shimla Planning Area. As per 2001 Census, out of total population of 1,74,789 persons, 143917 persons are literate and 30872 persons are illiterate. It reveals that 82% of total population of Planning Area is literate. The number of literate persons in Municipal Corporation, Shimla, Ghanahatti Special Area, Kufri Special Area, Shoghi Special Area is 119094, 8144, 8201 and 8478 persons respectively (Table-. It has been observed that literacy rate of females is lower than that of males. Out of total literate persons, 84200 are males and 59717 are females. The following figures illustrate settlement-wise educational status, proportion of literate males and females.

**Table 4.6 : Proportion of Literate Persons ( 2001)**

Settlement	Literate	Male	Female
M.C. Shimla ( including Dhalli, New Shimla & Totu SA's )	119094	69545	49549
Ghanahatti Special Area	8144	4985	3159
Kufri Special Area	8201	4865	3336
Shoghi Special Area	8478	4805	3673
Whole Planning Area	143917	84200	59717

Source: Census of India 2001

#### 4.8.6 PROJECTION

##### Population Projection

Total population in the year 1991 = 129827

Total population in the year 2001 = 1,74789

According to Geometric Increment Method:

$$P_n = P_o (1+r)^n$$

Population in the year 2021 = 315688 (Annexure – I)

As far as floating population is concerned it is anticipated to be 76000 and 100000 for the year 2011 and 2021 (Table – 4.7)

**Table - 4.7: Population Projection**

Year	Persons	Decadal Variation	% Age Decadal Growth Rate
1971	72870	-----	-----
1981	95851	22981	31.54
1991	129827	33976	35.54
2001	174789	44962	34.63
2011	234902	60113	34.4
2021	315688 ✓	80786	34.4

Source: By Author based on mathematical calculations

**Table - 4.8 : Floating Population Projection**

Year	Floating Population	% Age Decadal Growth Rate
1971	23459	36.00
1981	30000	31.74
1991	40000	31.70
2001	56000	40.00
2011	76000	35.00
2021	100000	31.00

Source: By Author based on mathematical calculations

#### 4.9 INFERENCES

Population increase has become one of the main challenges in Shimla. Resident as well as floating population is exerting heavy pressure on the resources of the city. Availability of the various facilities is the main reason for the increase in the resident population of the city. Second main reason for the increase in the resident population is non availability of good educational and medical facilities in the other parts of the state. Even floating population has started increasing in Shimla. In 2001, percentage decadal growth rate of floating population was 40% as compared to 31.7 percent in 1991.

But this state of affair is not good for the city in long run considering sustainability of the city. Every city has fixed resources which can be exploited to a certain limit only. But increasing population will result in over exploitation of the resources like land, water and forests, which will ultimately result in the disturbance in the ecology of the entire region and sustainability of the city will be challenged. Hence there is an urgent need to fix a maximum population for the city so that sustainability is ensured.

The population projections have been made for the year 2011 and 2021 using Geometric Progression method (Annexure-I). Results have been analysed with past trends and it is anticipated that there will be a population of 2,34,902 and 3,15,688 respectively (Table – 4.7). It is assumed that population of Shimla Planning Area is anticipated to increase at the rate of around 35 % during the decades of 2011 and 2021. But it is also anticipated that increasing trends of migration and decreasing death rate will affect the projected population. Shimla's changing socio-economic conditions and better amenities are now the major pull factors for rural population migrating to the city. If the migration is unchecked, no doubt, it will have its adverse effect on the growth of population and overall development of Shimla City. Ironically, the city is crying for respite and denying any more population.



# **CHAPTER - 5**

## **ECONOMIC PROFILE**

**5.1 Introduction**

**5.2 Work force**

**5.3 Trade and commerce**

**5.4 Industrial scenario**

**5.5 Economic potential**

**5.6 Study of tourism**

**5.7 Inferences**

## 5. ECONOMIC PROFILE

### 5.1 INTRODUCTION

To achieve sustainable development in the city, sustainability of the economy is of prime concern. Thus, sustainability of the economy can only be assured when main economic activities of the city are sustainable.

Shimla being state & administrative capital of Himachal Pradesh, majority of economic activities are concentrated in Shimla. Natural resources play a key role in economic survival of the town and hinterland, as tourism and agriculture, are the mainstays of the economy. The shift from agriculture to horticulture has changed the economic pattern of the region and Shimla has become major center for collection and distribution.

**Primary Sector:** primary sector has a very feeble presence in economy of Shimla where only 10% of the working population is engaged.

**Secondary Sector:** secondary sector plays an intermediate role in city although the no. of industries are quite a lot but they are very small scale industries.

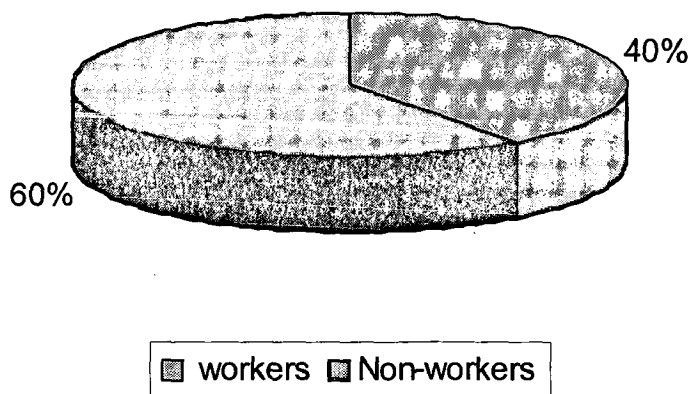
**Tertiary Sector:** tertiary sector has become one of the prime sector of economy over the years. This can be seen in the quite high no. of service based industries as compared to other types.

### 5.2 WORK FORCE

The capacity of a city to provide employment opportunities and absorb the work force in various sectors of economy is an index of prosperity. The participation ratio gives an idea of the share of gainfully employed population against the dependent and non-working population. As per 2001 Census, there are 69197

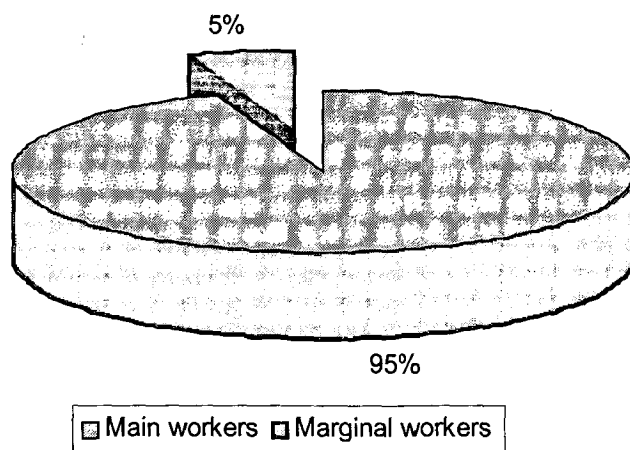
workers (40%) and 105592 (60%) non-workers. Out of total workforce, there are 65402 main workers and 3795 marginal workers. The detailed description of workforce of Shimla Planning Area is as under:

**Fig. – 5.1 : Workforce**



Source : Source: Census of India, 2001

**Fig. - 5.2 : Main & Marginal Workers**



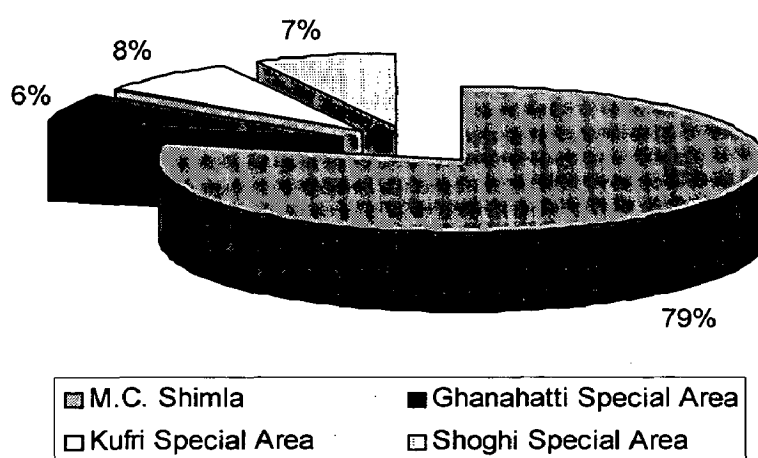
Source: Census of India, 2001



**Table - 5.1: Settlement-wise Number of Workers**

Settlement	Workers	Male	Female
M.C. Shimla ( including New Shimla, Dhalli & Totu SA's)	54404	44611	9793
Ghanahatti Special Area	4205	3055	1150
Kufri Special Area	5447	3499	1948
Shoghi Special Area	5141	3341	1800
<b>Planning Area</b>	<b>69197</b>	<b>54506</b>	<b>14691</b>

Source: Census of India, 2001

**Fig. – 5.3 : Settlement-wise Workforce Participation**

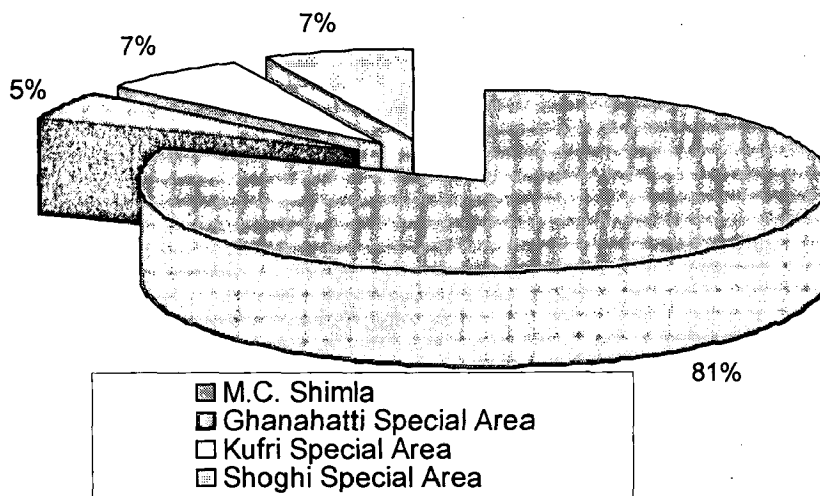
Source: Census of India, 2001

**Table – 5.2 : Settlement wise Main Workers**

Settlement	Main Workers	Male	Female
M.C. Shimla ( including Totu, New Shimla & Dhalli Special Area)	52809	43514	9295
Ghanahatti Special Area	3480	2807	673
Kufri Special Area	4558	3184	1374
Shoghi Special Area	4555	3129	1426
<b>Planning Area</b>	<b>65402</b>	<b>52634</b>	<b>12768</b>

Source: Census of India, 2001

**Fig. - 5.4 : Settlement-wise Main Workers**

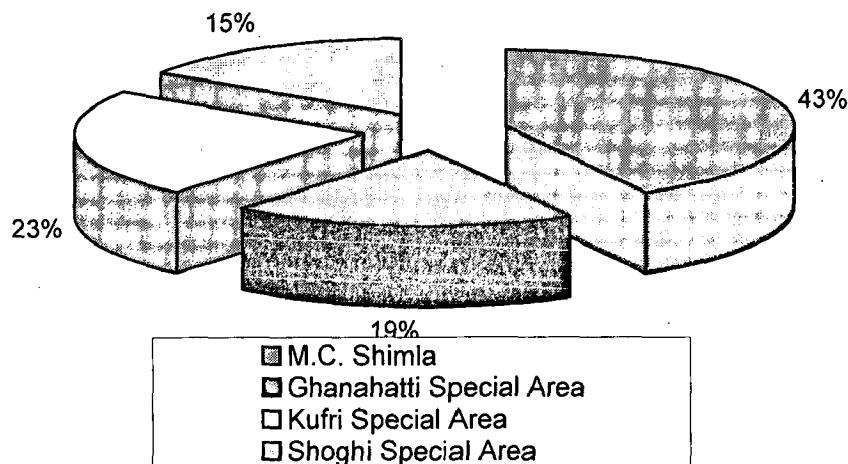


**Table- 5.3 : Settlement wise Marginal Workers**

Settlement	Marginal	Male	Female
M.C. Shimla ( including Tuto, New Shimla & Dhalli Special Area)	1595	1097	498
Ghanahatti Special Area	725	248	477
Kufri Special Area	889	315	574
Shoghi Special Area	586	202	384
<b>Planning Area</b>	<b>3795</b>	<b>1862</b>	<b>1933</b>

Source: Census of India, 2001

**Fig. - 5.5 : Settlement Wise Marginal Workers**



Source: Census of India, 2001

**Table – 5.4 : Settlement Wise Workforce Participation**

Category	M.C area.	Ghanahatti SA	Kufri SA	Shoghi SA	Total
Cultivators	439	1199	2384	2474	6496
Agriculturist	149	115	107	172	543
Household Industry	504	52	42	106	704
Others	53312	2839	2914	2389	61454
<b>Total</b>	<b>54404</b>	<b>4205</b>	<b>5447</b>	<b>5141</b>	<b>69197</b>

Source: Census of India, 2001

**Table – 5.5 : Workforce Structure**

Category	Total	%age
Cultivators	6496	9.00
Agriculturist	543	1.00
Household Industry	704	1.00
Others	61454	89.00
<b>Total</b>	<b>69197</b>	<b>100.00</b>

Source: Census of India, 2001

From above figures it can be seen that in work force participation M.C. area including special areas of Tutu, New Shimla and Dalli play a vital role. This is due to the high density in these areas. 81% of the main workers belong to M.C. area and 43% of the marginal workers are from M.C. area as shown in above figures.

As stated earlier, Shimla being the service sector dominated city, measure contribution of the work force is in service sector. Cultivators and agriculturist are meager 9% and 1% respectively. Others segment which constitute 89% of the work force mostly including people engaged in service sector.

### **5.3 TRADE AND COMMERCE**

Shimla being a Capital of State is known for administration and commercial activities, apart from tourism and institutions. Shimla is the only major urban centre in Himachal Pradesh connected with rest of India both by rail and road. It is also well connected with rest of Himachal Pradesh. All these factors have made Shimla a goods collection and distribution centre. Relevance of Shimla as a commercial centre is increasing with increase in population and urbanisation. As more and more people started coming in, the needs and demands of the larger population of Shimla town attracted number of shopkeepers, big and small from almost all parts of India.

In 1971 there were about 1440 commercial establishments in Shimla Planning Area. Presently, there are about 3000 commercial establishments at present and area under commercial activities is about 25 Hectares. It reveals that there is 36% decadal growth of commercial establishments in Shimla Planning Area.

The development of above said sector of economy overtime has made the city hub of apex order multifarious economic activities. The regional level trade and commerce function combined with tourism have further strengthened the economic base of this hill city.

#### **5.3.1 Wholesale trading centres**

As physical hindrances pose constraints, the city doesn't possess large size wholesale trading centre as persist in the plains. A few regional level wholesale Trading Market Centres, which cater for needs of a few city districts are located in Dhalli - Bhatakufar areas and Automobile centres at Shoghi and other parts of planning area.

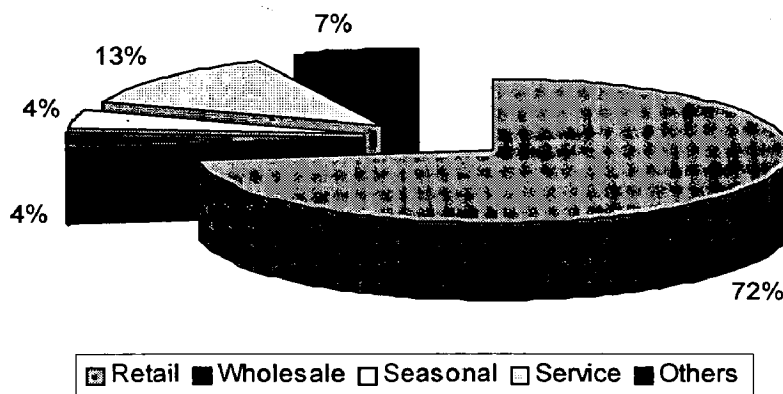
### 5.3.2 Shopping complexes and market centres

The existing main shopping centres and complexes are concentrated in and around the Mall in localities namely, Middle Bazaar, Lower bazaar, Lakkar Bazaar and Chhota Shimla. Other newly developed commercial areas are in Kusumpti, New Shimla, Dhalli and Boileauganj. These centres are fulfilling basic needs of surrounding residential extensions.

### 5.3.3 Nature of shops

Shimla town is vibrating with trade and commercial activities. Most of the shops are retail, which account for 73%. However, 4% of shops are dealing in wholesale. Service shops account for 13%. Out of total commercial establishments in city, 7% shops are of other kinds. The nature of shops is as shown in fig. – 5.6.

Fig. – 5.6 Nature of Shops

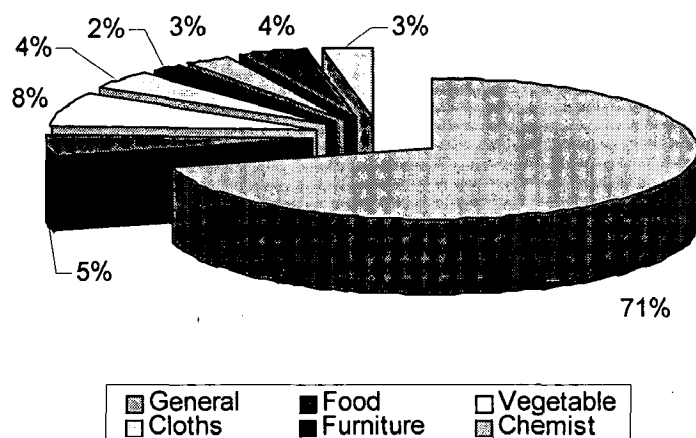


Source: Town & Country Planning Department

### 5.3.4 Classification of shops

There are vegetable, cloth, furniture, fruit jam and Jewellery shops. General merchandise shops are 71% and 29% are others shops as shown in fig. 5.7.

**Fig. – 5.7: Shops Classification**



Source: Town & Country Planning Department

**5.3.5 Age of shops**

**Table – 5.6: Age of Shops**

Sr. No.	Age of Shops	% of Total Shops
01	0-5	5 %
02	6-10	10 %
03	11-20	20 %
04	> 21	65 %
<b>Total</b>		<b>100</b>

Source: Town & Country Planning Department

The year of establishment of shops depends upon the inception of city as a Capital of the State and socio-economic development of city residents. Town & Country Planning Survey reveals that 65 % of present shops are more than 20 years old and 20 % shops have been established during the last 20 years in Shimla as shown in table – 5.6.

### 5.3.6 Customers in shops

Table – 5.7: Number of Customers

Sr.No.	Range of Customers	% age of Total Shops
01	0-25	3
02	26-50	7
03	51-100	28
04	101-500	24
05	501& above	38
	<b>Total</b>	<b>100</b>

Source: Town & Country Planning Department Survey

The centres of maximum concentration of customers during tourist season are the Mall, Middle Baazar and Lower Baazaar.

It has been observed that Shimla city is efficiently serving its local population, tourists as well as surrounding population. It is anticipated that number of commercial establishments is likely to be 3900 and 5300 by the year 2011 and 2021 respectively (as per Town & country planning estimates). There will be additional requirement of 26.54 Hectares area for commercial activities by the year 2021.

The commercial activities have come up here and there in every nook and corner of the city. Haphazard commercial pursuits, encroachments on the roads and intrusion and collision thereof with other activities is playing havoc. It has been observed that more than 65% commercial establishments are located in Central Shimla.

### 5.4 INDUSTRIAL SCENARIO

Shimla town has only small scale and service industries. The major factors that had been limiting the industrialization are the inhospitable geographical

features, inadequate and exorbitant cost of transport facilities and the absence of market in proximity. The region is also environmentally sensitive for industrialization. The city practically had no industrial growth till late 1960's. However, the traditional small scale industries like wool spinning, weaving, basket making and metal work, that use the local resources are still lingering but in vain without attaining progress. Presently there are about 449 small scale and service industries operating in Shimla Planning area (Table-5.8). These units are classified under the seven broad categories. About 2300 workers are employed in them. The city has great potential for the establishment of cottage and small-scale environment friendly industries. Locally available Raw material may be utilised and employment opportunities be generated so that economic condition of local people is improved. The description of existing industries is as shown in table – 5.8.

**Table – 5.8: Types of Industries and Number of Workers**

Category of Industry	No. of Units	No. of Workers
Textile	18	60
Manufacturing	110	494
Communication	44	154
Auto Repairs	52	228
Food Products	63	294
Servic Industries	117	384
Others	45	686
<b>Total</b>	<b>449</b>	<b>2300</b>

Source: District Industries Statistics 2005, Shimla



**Table – 5.9: Spatial Distribution of Industries**

Location	Units	Workers
Shimla M.C.	219	909
Kufri	46	241
Shoghi	54	652
Dhalli	39	145
New Shimla	42	172
Totu	27	100
Ghanahatti	22	81

Source: District Industries Statistics 2005, Shimla

Shimla has emerged a multifunctional city with dominance of tourism, administration, institutional, trade, and commerce and transport activities. Due to this hotel industry is at its peak. However, other industries are not playing a much influential role. It is, however, imperative that environment and eco-friendly industries based on local raw material are established on the western periphery in the vicinity of Shoghi and Ghanahatti. In view of least pollution in the peripheral area technology based electronic industries may be established.

### 5.5 ECONOMIC POTENTIAL

Considering the present economic status of the city, it is anticipated that city's economy will be dominated by service sector. There are various potential areas where city's economy can grow in future. The key economic drivers for economic growth of Shimla Planning Area can be identified as following –

- Tourism
- Healthcare
- Education
- Agro-processing
- Trading
- IT.

## 5.6 STUDY OF TOURISM

Tourism is universally accepted as the largest industry of the world. Growth of tourism has a multiplier effect on economy as it impacts the growth of many other industries, which are not directly related to tourism. Share of tourism in India's GDP is 5.6, while the world average is 10%. Tourism is a highly employment intensive industry and has been recognized as a catalyst for economic growth worldwide. While the world average of employment in tourism is 10.8% of the workforce, India has had only 5.6% of the labour force engaged in tourism related jobs (Planning Commission December, 2002).

Tourism plays very important role in the economy of the city like Shimla. Shimla is basically a service based city and tourism is one of the prime area which is giving boost to city economy. It is estimated that every rupee spent by a tourist changes hands thirteen times, and that every hotel room generates direct employment to three persons and indirect employment to eight persons (Estimated by state tourism department). Hence, the tourism sector provides a large scope for generating employment opportunities.

To achieve sustainable development in the city, sustainability of the economy is of prime concern. Thus, sustainability of the economy can only be assured when tourism of the city is sustainable. At present tourism industry is in crisis state due to the inadequate tourist infrastructure and degrading environment. Some of the facts given below show the contribution of tourism towards state and city economy.

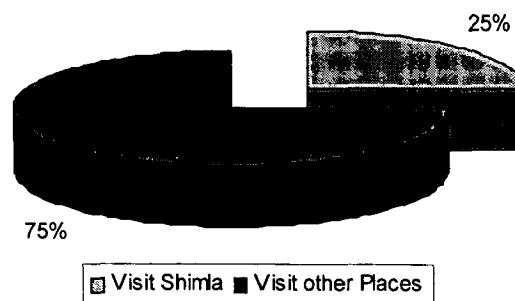
- Himachal Pradesh has one of the greatest adventure tourism assets in the world in the form of Himalaya and mighty rivers.
- Tourism has always been a growth industry in Himachal Pradesh.

- Tourism contributes nearly 8% of the State Domestic Product.
- In 2005-06 the investment in tourism sector in Himachal was about 102.32 crore of which about 26 crore was in Shimla alone.
- Revenue generated from tourism was 2.5 crores in 2005 from city alone.

### 5.6.1 Present status

Shimla is known as '**Queen of Hill Stations**' and destination for tourists from all over the world. The splendid views of the snow-clad ranges of the Himalayas, fine walks through oak and flowering rhodendron, enchanting resorts within easy reach, Golf at Naldehra and Skiing at Kufri and Narkanda make Shimla an attractive destination throughout the year. Shimla has attractive topography, characterized by interlocking spurs, narrow and steep valleys with high peaks and thick forests. Its salubrious climate and strikingly lovely scenery attract a number of Indian and Foreign tourists. As compared to other districts, arrivals of tourists is higher in Shimla. The city is known for its British heritage and has numerous masterpieces intact even today. Besides this, Shimla is the most important entry point to the upper region of the State. The tourists who intend to visit other tourist centres of the State such as Kullu, Manali, Kinnaur, Sangla valley and Sarahan usually come Shimla, making it not only an important destination point but also an important transit point. It has been observed that **10000** tourists per day visit Shimla in peak time. As per tourism department Statistics, **25 %** of the total State tourists visit Shimla Planning Area (fig.-5.8).

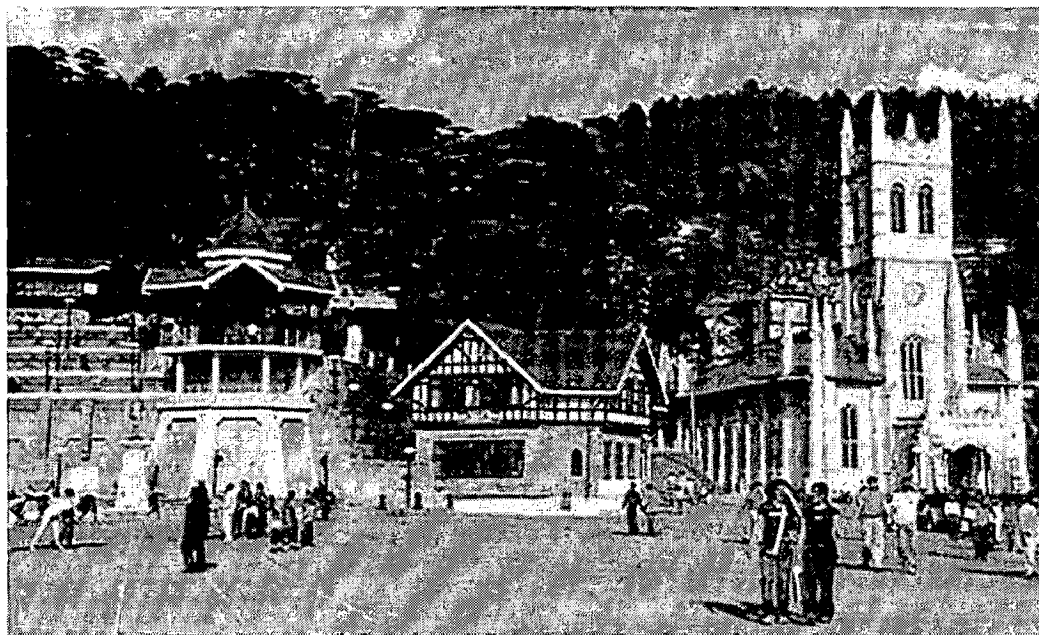
**Fig. – 5.8: Proportion of Tourists**



## 5.6.2 TOURIST ATTRACTIONS

### Local Tourist Nodes

- i) **The Ridge** This large open space in the heart of town presents excellent views of the mountain ranges. Shimla's landmarks - the neo-gothic structure of Christ Church and the neo - Tudor library building - are worth seeing. Altitude of the ridge is 2130 metres. The Ridge is not only a portion of land in Shimla; it acts as lifeline of the city. The church on the ridge has witnessed numerous historical events.



Visual 5.1: The Ridge

(ii) **The Mall**

From Boileauganj to the Ridge and onwards to Chhota Shimla along with heritage masterpieces, the mall road is highly fascinating and main attraction to the tourists. Whosoever, tourist visits Shimla, he enjoys the beauty of this unique pedestrian artery.

**(iii) Kufri**

As Shimla gained importance, Kufri also began to be recognized as an important place to be visited near Shimla. Kufri is famous for its beautiful

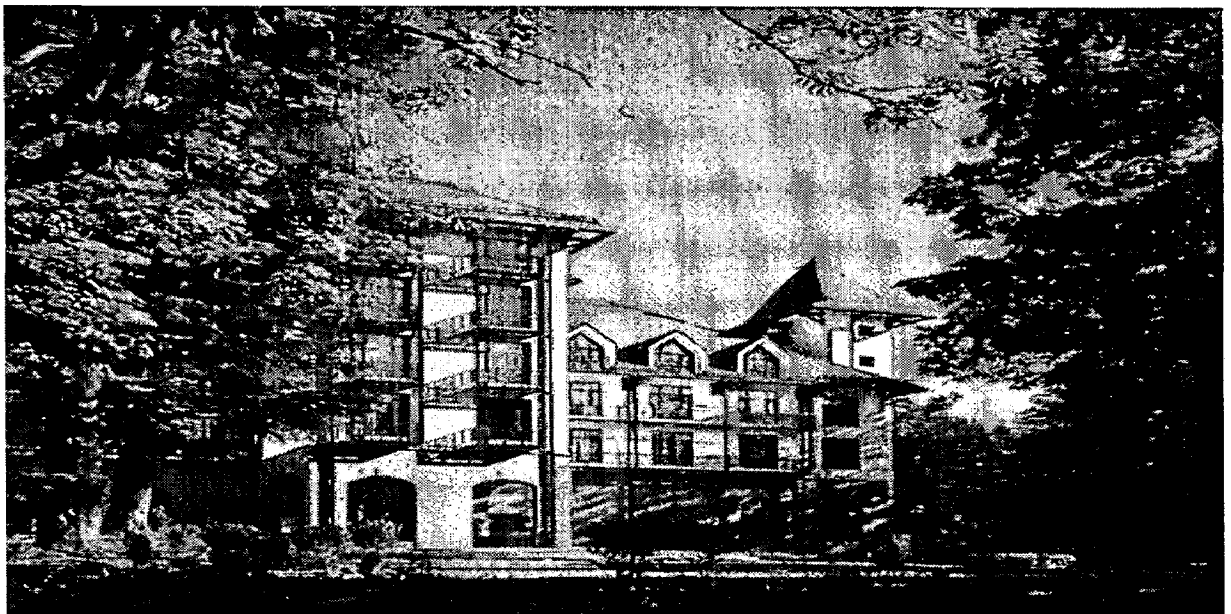


**Visual 5.2 : Ice –skating area in Kufri**

environs and cool refreshing atmosphere that pervades it. In summers, travelers enjoy the panoramic view of the surrounding verdant valleys and snow-capped peaks. There are a number of picnic spots, hiking and trekking trails in and around Kufri. A winter sports festival is organized every year in the month of February at Kufri.

**(iv) Wildflower Hall**

This magnificent place is famous for its lush green surroundings. It is 13 Km. from Shimla and situated at a height of 2600 mtrs.. Amidst the Coniferous Deodar forests it is highly fascinating place.



**Visual 5.3 : Wildflower Hall Hotel at Chharabra**

**(v) Mashobara and Craignano**

There is a Summer Retreat of former ruler of Faridakot. The President of India usually visits and stays over here.



**Visual 5.4 : Apple Trees in Craignano**

It consists of St. Crispin's Church, Kali Temple, Fruit Research Station having exotic trees and plants. Craignano is 3 km away from Mashobra. Annual Sipi hill fair, in honour of Sipu Devta is held over here. Admire Oak and pine trees, it is an interesting place.

**(vi) Jakhu Temple**

Jakhu hill looms over Shimla city and is the geographical nucleus. The Hanuman temple at the top of Jakhu hill is the highest point in the city. Jakhu is derived from Yaku after Yaksha. It is a spot for excellent view of sunrise, mountains and the city.



**Visual 5.5 : View of Jakhu area**

**(vii) Naldehra:**

Naldehra is situated at a height of 2044 metres above sea level, about 22 kms. from Shimla. This place does not confine its activities to Golf alone, but the day hikes and excursion through the woods and villages are other attractions for the tourists and nature lovers. Naldehra has one of the

---

world's oldest Golf Club. Lord Curzon (1866-1904) the then Viceroy discovered Naldehra, set under a thick mane of Himalayan cedar- deodar trees. The Naldehra spur is an off shoot of the Kufri which is the highest spot in the Shimla area. The Golf Course took shape on totally natural topography, which remained untouched to the present day. Soon after Lord Curzon's departure from India, the Naldehra Golf Club came into being and has been in existence since 1905. The 'Naldehra' name is regarded to have come from the temple of 'Nag Devta', serpent deity, whose temple is situated inside the beautiful and serene Golf Course.

**(viii) Tibet Monastery**

A head Lama of Gompha, built it in unique Tibetan architectural style at Sanjauli and Kasumpti. The monastery is famous for Buddhist Lamas and nuns for their spiritual rituals, who worship over here. Old Thangka paintings are one of the main attractions of monestry.

**(ix ). Tuti Kandi**

This is also one of the important tourist spot. Himalayan Geological Park is located here. There is an old temple dedicated to Lord Krishana.

**(x ) Sri Sankat Mochan**

Sri Sankat Mochan Hanuman temple is built by Baba Neem Karori Maharaj.It is made of stone in natural surroundings. It is an unique example of Dravidian Temple style.

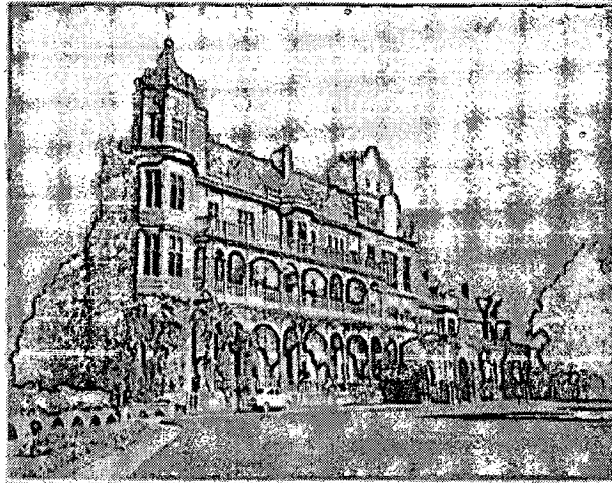
**(xi) Prospect Hill**

Kamna Devi temple, also known as Krera Devi Mandir is situated on the summit of Prospect hill. Moonrise and sunset can be seen here together.

Excellent view of Jutog, Subathu, Tara Devi. Solan district, old Shimla-Kalka path and Choor Chandi Dhar ranges can be seen from this spot.

**( xii ) Indian Institute of Advance Studies.**

Viceregal Lodge is located on the Observatory Hill. Also known as Rashtrapati Niwas, it was formerly the residence of the British Viceroy Lord Dufferin. It was the venue for many important decisions,



**Visual 5.6 : Viceregal Lodge**

which changed the fate of the sub-continent. It is quite befittingly the only building in Shimla that occupies a hill by itself. This rambling Scottish baronial edifice was designed by Henry Irvine, architect to the Public Works Department of the colonial government in India.

After independence, the Lodge remained the Summer Retreat of the President of India. In the early 60s the President of India, Dr. S. Radhakrishnan, a leading philosopher and writer and the Prime Minister Jawaharlal Nehru decided to make it a scholars' den where the best minds would find an ideal retreat. That's when the Indian Institute of Advanced Studies moved into the Vice-Regal Lodge in 1965.

**( xiii) Birds' Sanctuary**

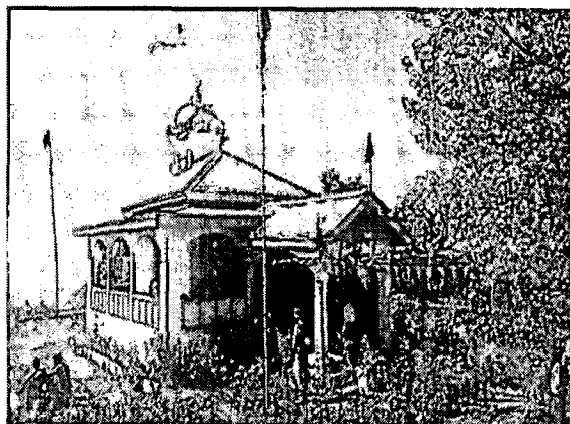
Himalayan Birds' sanctuary is situated near Petter Hoff Hotel. It has many rare colourful birds.



**( xiv ) Tara Devi**

The temple was built 2000 years ago by Rana of Junga, Bhupendra Sen.

Named after Taradinath, a holy man who made the statue of Devi, it has a fascinating location from where the view of Shimla is highly majestic and alluring.



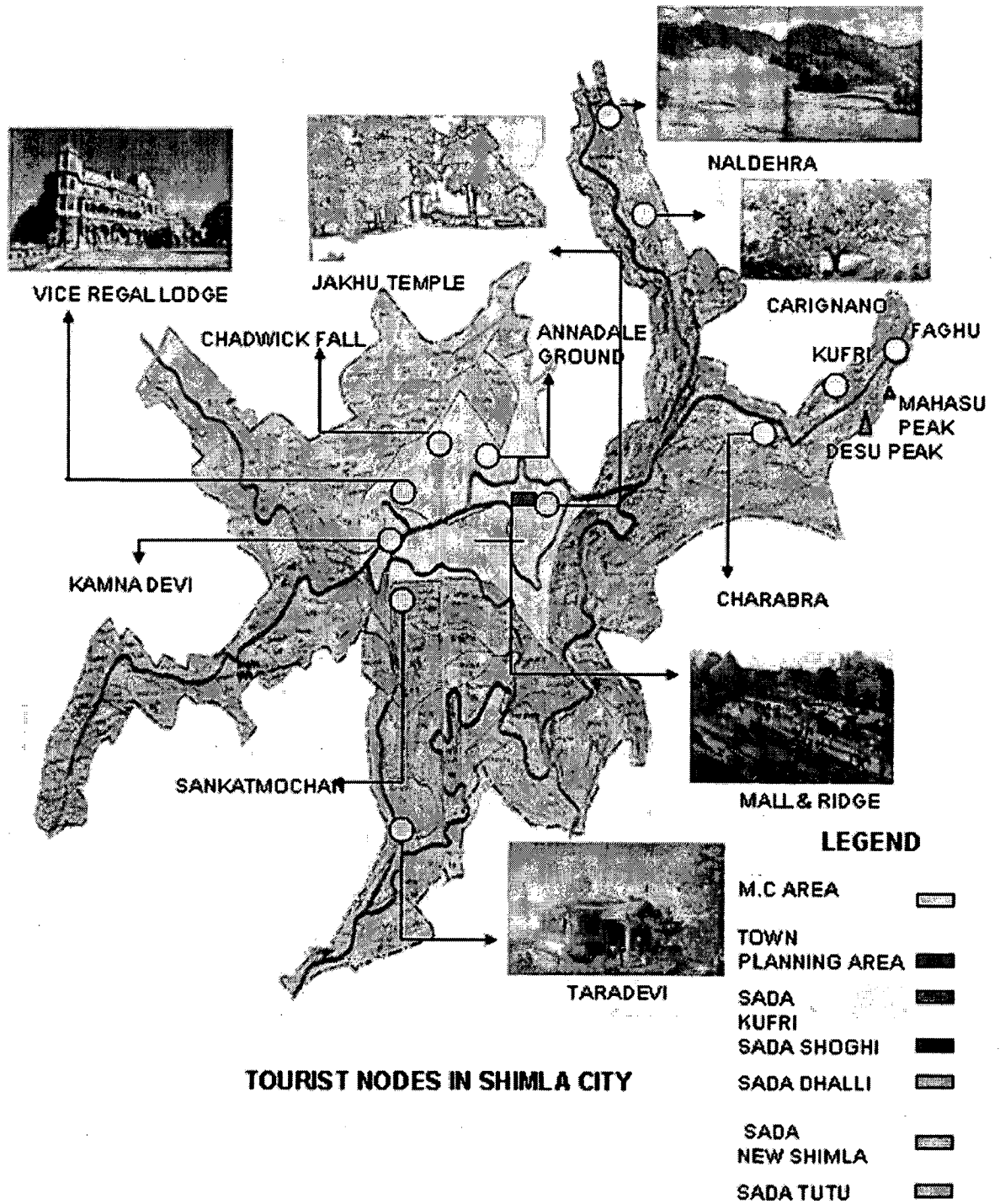
**Visual 5.7 : Tara Devi Temple**

**( xv ) Dhingu Temple**

Located on the top of Dhingu peak, near Sanjauli, there is a temple of deity. View from the hill top of all around including the mighty Himalayas is highly fascinating.

**( xvi )** Other important places worth visit around Shimla are Chadwick fall, Annadale Golf Course, State Museum, Jubbarhatti and Jatogh.

**Fig. - 5.9: Tourist Nodes in Shimla City**



### 5.6.3 REGIONAL TOURIST NODES

#### ( i ) Narkanda

Narkanda is 64 km. from Shimla on Hindustan Tibet Road. This place offers view of the snow-clad Greater Himalayas and especially Hatu Peak (3300 mtrs high). Skiing courses of different



duration are held here every year.

**Visual 5.8 : Trekking route in Narkanda**

#### ( ii ) Kotgarh

Apple valley of Kotgarh and Thanedhar is 80 Km. from Shimla. Samuel Evans Stokes had planted apple for the first time in this valley . Apple has now become the mainstay of entire economy of valley. The beautiful area, lacks tourist facilities.

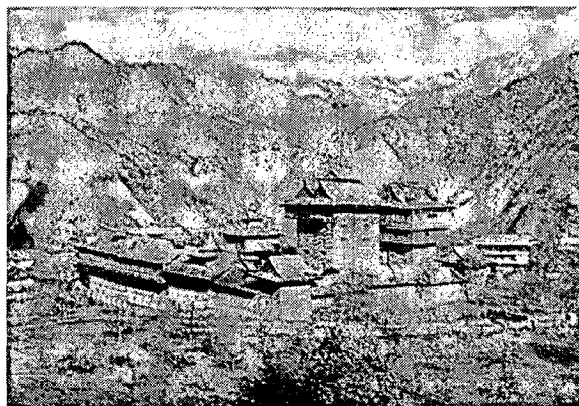
#### (iii) Khara Pathar :

As name indicates, 'Kahra Pather' has huge free- standing egg-shaped boulder. This is a remarkable natural wonder of the area. This point is also marked as edge of ridge. After it there is a steady descent to the Pabbar Valley.

#### (iv) Sarahan

Situated on the border of Shimla and Kinnaur Districts, Saharan is 180 Km. from Shimla. The place with immense natural beauty and architectural

splendour is the place of Bhima Kali- the diety, which is visited by devotees with high reverence



**Visual 5.9 : Bhima – Kali Temple**

**(v) Hatkoti**

Amidst the green fields in the valley, there is a temple of deity with distinct architectural style.

**(vi) Shalini Peak**

Visible from Shimla and facing Mashobra is the 'Shalini Peak'. It has a height of 3200 metres. The summit presents an unimpared view of the area.

**(vii) Rampur**

At 135 Kms from Shimla, Rampur was the Capital of old Rampur Bushahar State. This valley town has spectacular built heritage.

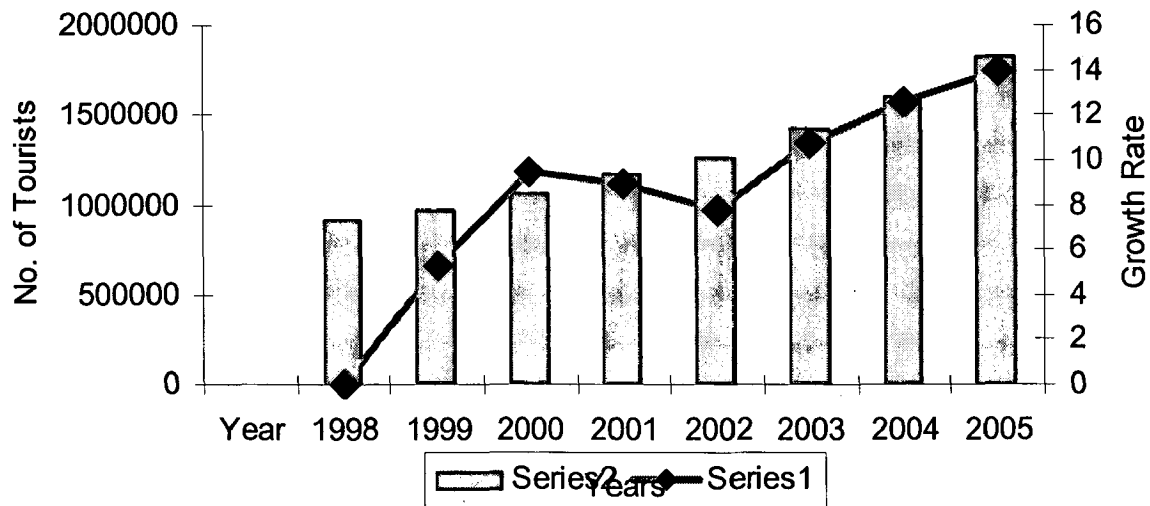
#### **5.6.4 Tourists trend**

In view of easy accessibility by road, Air and Railway line, Shimla is well connected with other parts of the Country. It attracts tourists from various walks of life. Number of tourists has increased from 612508 in 1998 to 1822059 in 2005. Annual tourist arrivals are given in table – 5.10.

**Table – 5.10: Tourist arrivals and growth**

Year	No. of Tourists	Variation In Growth	% Variation
1998	612508	-----	-----
1999	662661	50183	5.21
2000	1063200	100506	6.45
2001	1167085	103885	8.60
2002	1265186	88775	7.75
2003	1418035	52000	10.77
2004	1597246	179211	12.6
2005	1822059	224813	14

Source: Deptt. of Tourism, Himachal Pradesh. Tourists Statistics, 2005.

**Fig. – 5.10 Annual Tourists Inflow**

Source: Deptt. of Tourism, Himachal Pradesh. Tourists Statistics, 2005.

#### 5.6.4.1 Seasonal Tourists' Variation

Annual tourist traffic has been analysed, which reveals that the arrival of tourists begins from the month of March onward and goes up to the end of the July. Arrival of tourists in subsequent months declines due to change in weather

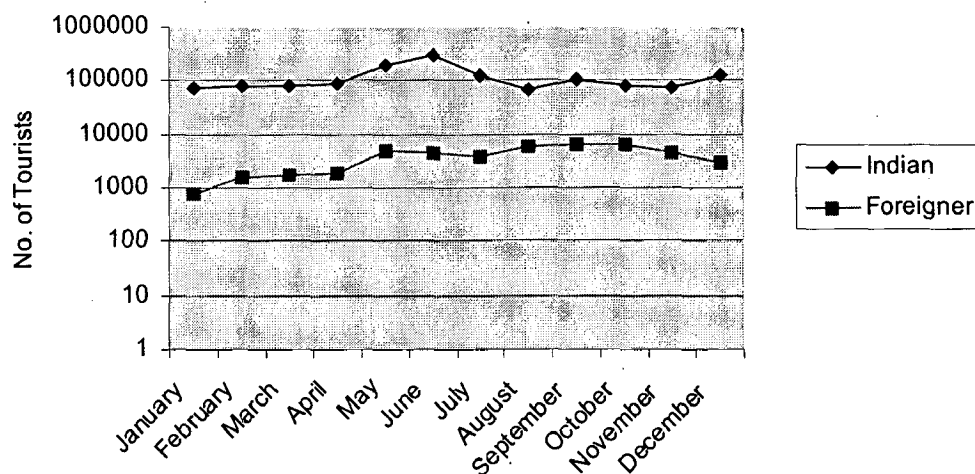
conditions. December onwards tourists inflow accelerates due to snow-fall and other winter adventure sports. As per Tourist Statistics, in summer season tourists arrival is about 48 %, whereas 52 % tourists visit is in the subsequent seasons. Maximum numbers of tourists come in the month of June. Details are given in table – 5.11.

**Table – 5.11: Monthly Tourists Variation**

Months	Indian	Foreigner	Total
January	71114	764	71608
February	77626	1462	76421
March	76753	1648	78401
April	88462	1774	60266
May	186366	4606	161305
June	268405	4565	302670
July	124568	3647	128245
August	66047	5761	74838
September	100656	6117	107073
October	82510	6512	86022
November	73226	4258	77487
December	124206	2863	127066
<b>Total</b>	<b>1373635</b>	<b>44400</b>	<b>1418035</b>

Source: Tourists Statistics, Tourism Department, 2005.

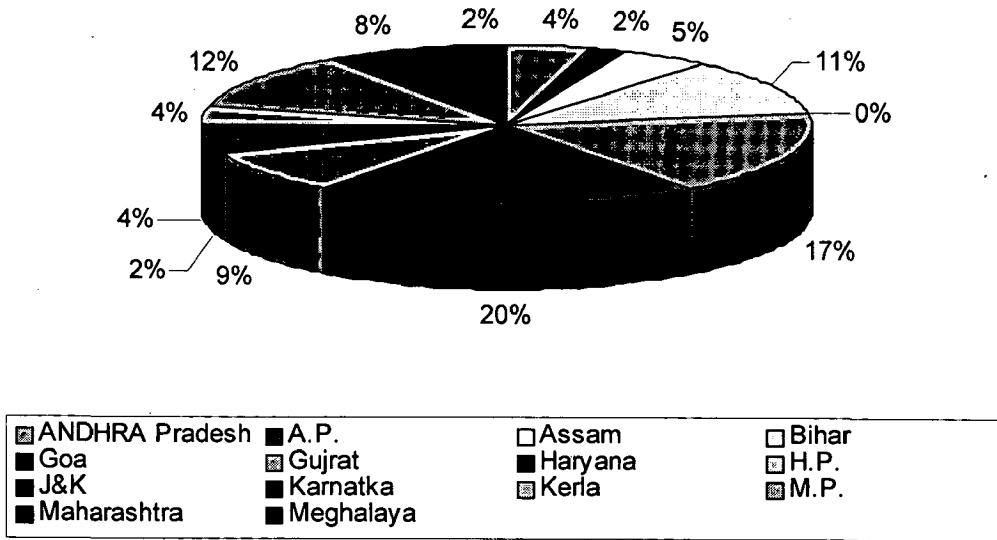
**Fig. – 5.11: Monthly Tourists' Variation**



**5.6.5 TOURISTS' CHARACTERISTICS:**

Various tourist characteristics can be understood from following data.

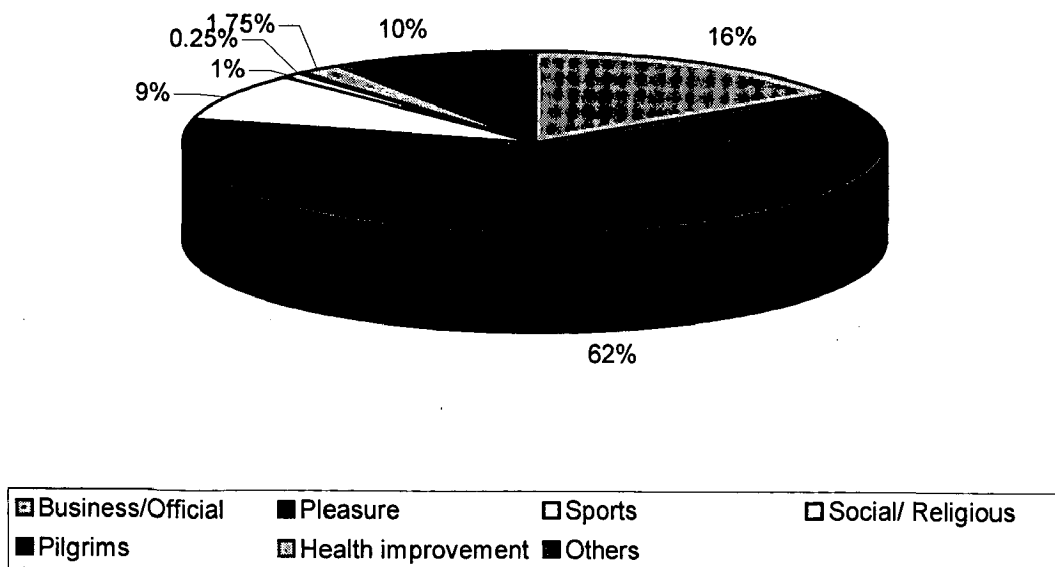
**Fig. - : 5.12 State-wise Arrival of Tourists**



Tourist from many states visit Shimla, however, it has been observed that max. no. of tourist come from Haryana followed by Gujrat & M.P.

Source: Tourists Economic Survey Report - 2004

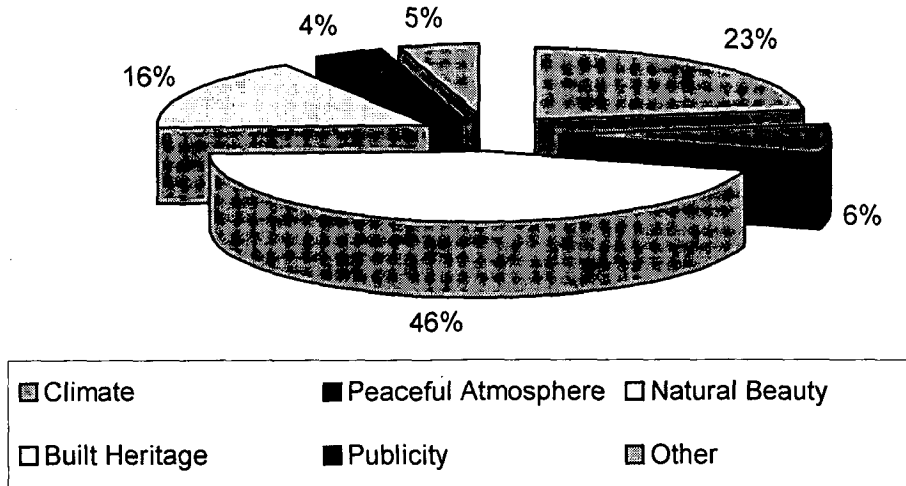
**Fig. – 5.13: Purpose-wise Distribution of Tourists**



Source: Tourists Economic Survey Report - 2005

Pleasure is the dominant reason among tourists to visit Shimla followed by business and other purposes.

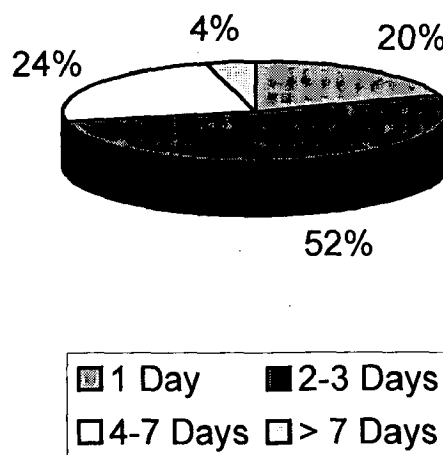
**Fig. – 5.14: Tourist Likeness**



Source: Tourists Economic Survey Report - 2005

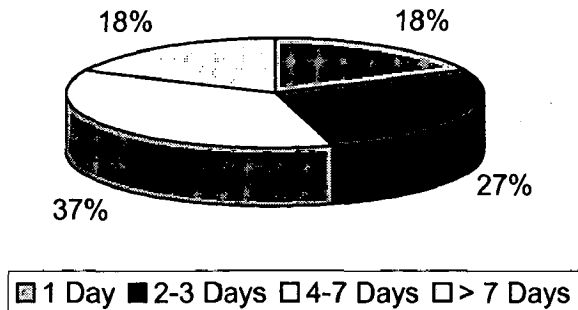
Natural beauty is the main thing which is liked by most of the tourists followed by climate and built heritage.

**Fig. – 5.15 : Duration of Stay(Indian Tourists)**



Source: Tourist Economic Survey Report - 2005



**Fig. 5.16:Duration of Stay(Foreign Tourists)**

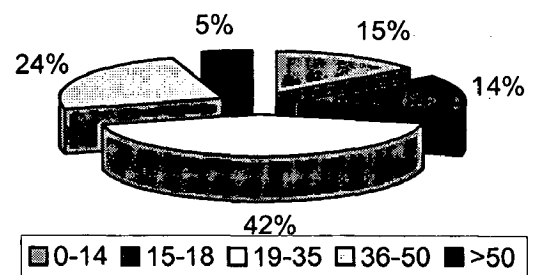
Source: Tourist Economic Survey Report - 2005

Maximum no. of Indian tourist i.e.52% stay for 2-3 days, whereas, maximum no. of foreign tourist i.e. 37% stay for 4-7 days.

#### 5.6.5.1 Age Structure of Tourists

**Fig. - 5.17:Age Structure**

The highest number of tourists is in the age group of 16-35 years, which account to 42.43% of the total tourists. This age group consists of newly married couples and individuals, who visit Shimla for



entertainment. The 24% tourists are in age group of 36-50 years, who visit Shimla for trekking, adventure and vacations. 5% tourists are in the age group of above 50 years, who visit Shimla for health improvement and 14% are children in the age group of 0-14 years (fig.-5.17).

#### 5.6.6 IMPACT OF TOURISM

As per Tourist Statistics, 4046 persons are permanently employed in Tourism Industry (Table-5.12), out of whom 3870 are Himachalis and 176 are

Non-Himachalis. But during peak time the direct employment goes up to 6000 people and indirect employment to 16000. Total making it to approximately 32% of the total workers in planning area. But during lean periods, employment opportunities fall down by 50% of the total peak employment.

Tourism is one of the important sources of revenue to the State Government. As per Excise and Taxation Department, Revenue generated from Hotels/Guesthouses in the form of luxury tax was 2.10 crores in 2005.

**Table – 5.12: Permanent Employment in Tourism Industry**

<b>Sector</b>	<b>Number of Workers</b>	<b>%</b>
Hotels/Guesthouses	3130	77.00
Restaurants/Bars	276	7.00
Tourist Guides	235	6.00
Travel Agents	188	5.00
Photographers	220	5.00
<b>Total</b>	<b>4046</b>	<b>100</b>

Source: H.P. Tourism Department, Tourist Statistics 2005

#### **5.6.6.1 Tourists' accommodation**

In Shimla Planning Area, there are about 31 Government and Semi-Government establishments like tourist hotels, Guesthouses and Rest Houses which cater for tourist accommodation. There are 205 private hotels and Guesthouses (Table-5.8). Besides this, 6 Dharmshalas also exist in Shimla Planning Area. Total bedding capacity is 6000 beds. Average number of tourists who visit Shimla per day is 4000. In peak season, particularly in June Month 10000 tourists per day visit Shimla city.

**Table – 5.13: Existing Hotels in Shimla Planning Area**

<b>Zone</b>	<b>No. of Hotels</b>	<b>Percentage</b>
Naldehra- Bharari	2	1.00
Shoghi- Panthaghati	1	0.48
Kufri	5	2.00
Central Shimla	168	66.52
<b>Total</b>	<b>205</b>	<b>100.00</b>

Source: Hotel Directory 2005, H.P. Tourism Department

The 66.52 % of the total hotels are located in the Central Area (Table -5.6). Diversification of tourists amenities and decongestion of tourist accommodation from the core of city are the major concerns. The cleanliness of the city, enhancement of green cover, efficient transportation network, planned housing and commercial development, over-all eco-friendly development are other points of attention for tourism.

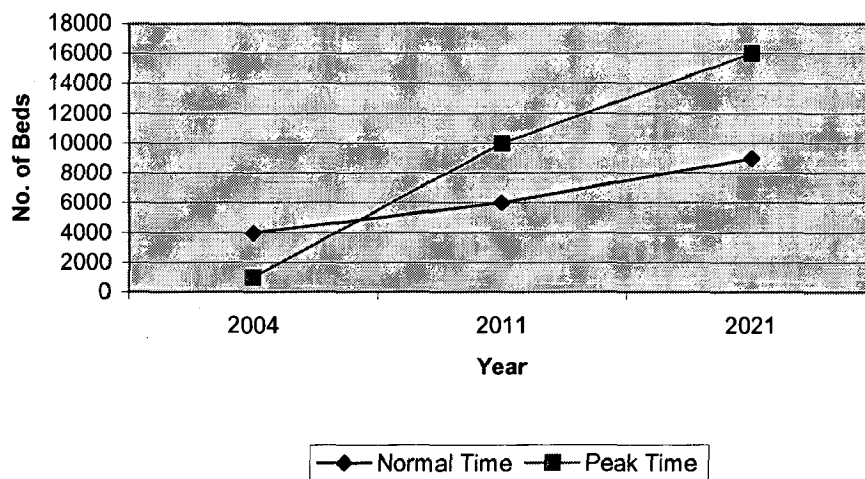
### **5.6.7 PROJECTED TOURISTS TRAFFIC**

The peak daily traffic for the year 2011 and 2021 is projected as 16000 and 22000 respectively. Thus, additional number of beds required for the year 2011 and 2021 is 10000 and 16000 in peak season (fig. – 5.18).

To cope up with the influx of tourists in Shimla Planning Area, proper infrastructural development assumes significance. These include additional provision of quality accommodation in view of economic categories, improvement of transportation, provision of adequate parking, luxury buses and organized recreational facilities. As the old town is already congested, therefore it is

proposed to develop new tourist accommodation primarily huts and other recreational facilities at satellite locations.

**Fig. – 5.18: Additional Requirement of Beds**



Source: H.P. Tourism Department, Tourist Statistics 2005

### 5.6.8 Sustainable Tourism through Eco-tourism:

Eco-tourism is defined as the purposeful travel to natural areas to understand the culture and environment, taking care not to alter the integrity of the eco-system, while producing economic opportunities that makes conservation of natural resources beneficial to the local people.

Eco-tourism is a young term that was first used by Hector Ceballor-Lascurain in 1987 to differentiate it from 'mass tourism'. He defined Eco-tourism as 'traveling to relatively undisturbed or uncontaminated natural areas with the specific objective of studying, admiring and enjoying the scenery and its wild plants and animals as well as any existing cultural manifestations (both past and present) found in these areas'. Eco-tourism is further explained as 'responsible travel that conserves natural environment and sustains the well being of local people'. Thus Eco-tourism embraces "environmentally-friendly", "community-friendly", and

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“market friendly” tourism that is developed on the concept of ‘sustainable development’.

Eco-tourism is the fastest growing sector of the tourism industry that attracts 40% to 60% of all international tourists. WTO States that eco-tourism has an annual growth rate of 5% worldwide and represents 6% of GDP and 11.4% of all consumers spending.

There are three specific segments of eco-tourism

- Nature tourism, based on natural attractions.
- Adventure tourism, dealing with sports activities in various natural environments.
- Culture tourism, dealing with aspects of social & cultural heritage.

**The three major requirements of eco-tourism are -**

- There must be a direct return of reasonable share of revenues generated by the business to local people and into the conservation of the local environment.
- Eco-tourism business must follow environmental principles.
- Tourists must learn not to disturb what they are visiting.

While there is no agreed universal definition of eco-tourism, but the general characteristics may be summarised as in the following -

- All nature-based forms of tourism motivate the tourists to observe and appreciate the nature as well as the traditional cultures.
- It contains educational and learning features.
- It is general organised for small groups by specialized and locally owned business groups.
- It minimizes negative impacts upon the natural & socio-cultural environment.

- Provides alternative employment & income opportunity for local communities.

Sustainable tourism is envisaged as leading to management of all resources in such a way that economic, social & aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems.

The concept of "Sustainable Tourism" thus started gaining importance. Consequently "Zero impact tourism" or "Eco-tourism" as a concept has caught on across the globe. Due this reason only 2002 was declared as the "International Year of Eco-Tourism" by the United Nations.

Considering the rich cultural and natural heritage of Shimla, and increasing degradation by the regular tourism activities, eco-tourism can provide a solution in long run for sustainable development of the city. At present only one eco-tourism site (at Potter hill) is functioning on experimental basis for last few years. Experience of this only site is encouraging considering the tourist likeness and ecology of the area.

### **5.7 INFERENCES**

The Shimla region has a large variety of terrain, climate and vegetation. Various wild animals and birds live in it. Tourists are attracted to rich and varied array of natural, cultural, business, entertainment, sports and other attractions. There is a need to continuously renovate and improve such facilities, in order to sustain in the competitive market. Tourism is required to be well developed and managed in such a way that it benefits the resident population. Environment quality has to be improved. Heritage has to be maintained and preserved for tourism. Presently, however, degradation of environment and heritage are the major causes of worry and require to be immediately addressed. Shimla is witnessing an unprecedented

crisis to sustain the tourism due to degradation of its environs. In this situation, eco – tourism should be given high priority in Shimla and it should be propagated in consonance with environmental imperatives.

In order to safeguard the original character of Shimla, on one hand and to ensure its continued attraction for the tourists, on the other eco-tourism is the only way out. All the tourist activities must come up in accordance with environment.





# **CHAPTER - 6**

## **ECOLOGY AND ENVIRONMENT**

**6.1 Introduction**

**6.2 Physical deterioration**

**6.3 Mounting pressure on land resources**

**6.4 Stress on green cover**

**6.5 Geo-hazards**

**6.6 Environmental pollution**

**6.7 Other types of pollution**

**6.8 Inferences**

## 6. ECOLOGY & ENVIRONMENT

### 6.1 INTRODUCTION

Ecological balance of a particular area is of prime importance for the overall well being of the area and its inhabitants. Excess human activity in natural settings upset the ecology of the region resulting in ecological threats like sliding, earthquakes, floods and changing climate. So, it becomes essential that ecology and environment of the city or region get utmost importance in all developmental pursuits. Sustainability of any settlement can only be assured if ecology of the city is not disturbed to unmanageable extent. But unfortunately city under study presents a grim scenario as far as ecology and environment are concerned and hence sustainability of the city, at present, seems a distant dream.

### 6.2 PHYSICAL DETERIORATION

It is quite unfortunate that today Shimla has reduced to a concrete jungle. It is now just a city on a hill with din, dirt and curses that go with any deteriorating city. Greenery in Shimla is fast disappearing. With rising population, un-checked construction and depleting forests & increasing water crisis, city is heading towards an unmanageable situation



**Visual 6.1: Jam-packed core area**

There is a complete chaos in every sphere of the city. The drains are all dry, choked with waste and the roads overflow with water and dirt. Encroachments have reached serious proportions. Core area has become over crowded due to

excess business establishments. Even on the famous Mall, a number of shopkeepers have added a floor or two. Some hotels have opened shops in their basements and many others have extended their premises much beyond the permissible limits. Hundreds of two room hutments have come up in the Krishna Nagar area, near the General Bus Stand on steep slopes. Most of these dwellings have been constructed on Municipal land are unauthorized and look ugly.

Numerous buildings are in dilapidated condition. In many cases joint structures and properties under litigation are about to crumble. There have been at least three major building collapses in Shimla during the last few years. Shimla is a hill town where recently a number of multi-storeyed RCC framed structures have come up for residential or commercial purposes in private sector. In a number of such constructions, structural designs have not been followed. Considering this scenario, it seems that city is heading towards a big disaster.

### **6.3 MOUNTING PRESSURE ON LAND RESOURCES**

The original structure of city was designed for 25000 persons at pedestrian scale. Population of the city and migration to it have increased manifolds. The housing stock, water supply, transportation, sewerage, electricity supply and tourist infrastructure are under stress and strain. Every conceivable space has been utilized for constructions and to cater for infrastructural requirements. Thus Shimla has exhausted all physical thresholds and any more development shall be at the cost of health of the city at exorbitant costs. The immense pressure on land resources has led to environmental degradation.

Shimla has reduced to a hazardous city. It has congested built-up areas. Common problems of the city are *the disturbance to natural profile of land by cutting of terrain for constructions, haphazard development, traffic hazards, over concentration in the Central area, unauthorized constructions, encroachments on roads and public land, mixed land use, lack of integration between place of work and place of living, discrimination between population growth and urban infrastructure development, garbage nuisance and scanty care of natural and built heritage*



**Visual 6.2: Massive Constructions in Jiwanu Colony**

#### **6.4 STRESS ON GREEN COVER**

Spread over seven hills, covered with various tree species of deodar, pine, Oak, Kail, Rai and rhododendron, Shimla has lush green environs. Shimla is known for its City Forests. Depleting green cover due to massive constructions is the prime concern.

Besides delineation of Core and Restricted Areas, all areas possessing substantial green cover, but not classified as forest, whether in public or private ownership were designated as Green Belts and only reconstruction on old lines was allowed therein.



**Visual 6.3 : Green Belt in Chaura Maidan Area**

Thus, there are 15 identified green belts in Shimla.

Presently as per revenue records, the identified green belts in Shimla Planning Area are spread over 414 hectares, out of which 58% area is open area and 42% of the total green area is under forest cover. 36% is open area occupied by shrubs, bushes and grasslands. Out of the remaining 22% open area, 13% is built up and 9% under roads & paths.

Some green pockets are located either in Core or in Restricted Areas, wherein there is already heavy stress with respect to services, infrastructure and transportation. The prime green pockets are on the higher altitude and on slopes, though form the crown of the town. They are also suffering from heavy pressure due to constructions. Thus, look ugly and visually disturbing and same are not good from tourism point of view.



**Visual 6.4 :R.C.C. construction threatening green belt in Jakhu Area.**

The natural setting of the premier city of Shimla has already been disturbed a lot, due to felling of trees, even by foul means, to give way for constructions. Any more construction in these areas will aggravate the threats to green cover. Excessive use of R.C.C. has already damaged the ecosystem to a large extent. Indiscriminate tapping of natural resources in terms of wood and stone, construction of roads, has led to loss of scenic beauty of green cover in the city and its surroundings.

The eco-tourism development approach based on natural preservation imperatives, is most suited for Shimla, which calls for utmost care in preservation of traditional green cover, on one hand and plantation of evergreen long lasting trees, on the other. Kufri, Mashobra and Naldera are highly eco-sensitive due to precious Deodar green cover and steep terrain, therefore, it is imperative to restrict construction activity therein.

Conservation of the environmental quality of Shimla is possible through careful planning taking into consideration the ecological paradigms. Respect for the environmental paradigms in development planning can make the state capital can make an attractive location for national and international tourism.

### 6.5 GEO-HAZARDS

Metamorphosed Himalayan system has Shale series, permo- carboniferous, Pre- Cambrian group of rocks and hard sedimentary rocks . It has mountainous and sandy soil. Shimla city and its surrounding areas have a complicated physiography due to tectonic events, folding, faulting and thrusting processes, resulting inversion of topography and formation of irregular landforms. On account of predominance of dolomite and lime stone rocks, landslides are common. As rocks are unstable, dislocation of buildings can occur.

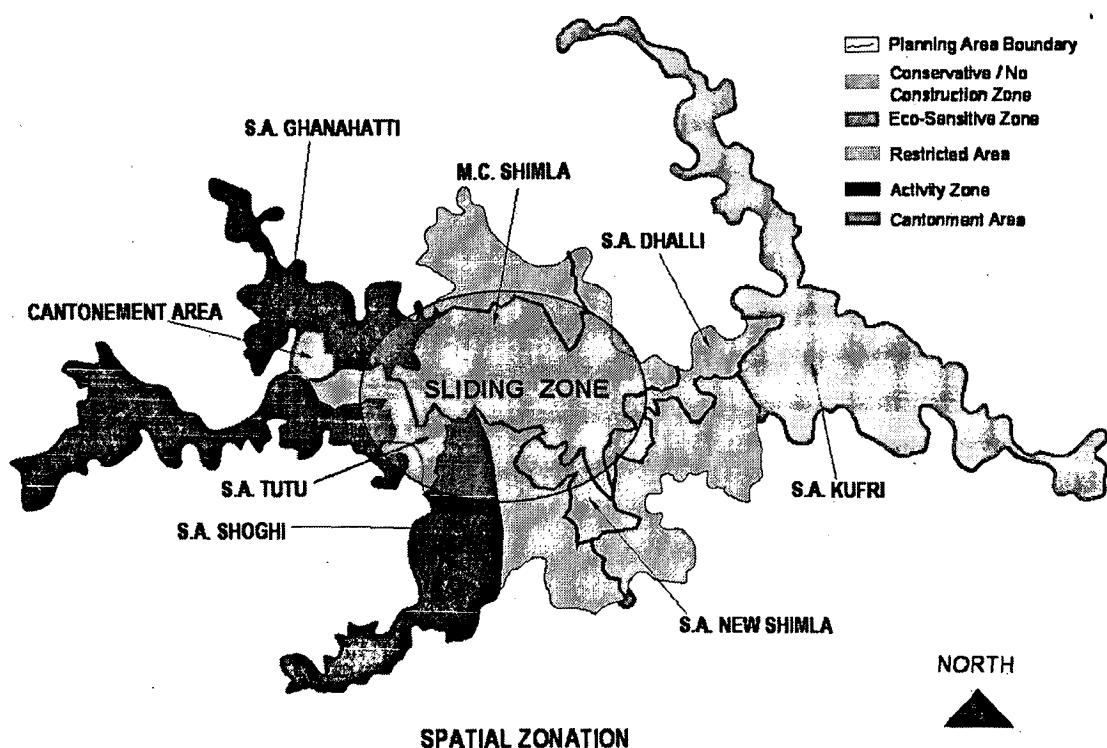


**Visual 6.5: Construction on steep slopes**

Shimla planning area has been divided into various zones as shown in fig.- 6.1. An area has been delineated comprising

of central core and some parts of the New Shimla, Dhalli, Tutu special area. In this area due to heavy pressure of already existing structures and rock types, land slides are very common. Due to this fact construction activities are banned in this area but still a lot of construction is going on ignoring the govt. regulations. Similarly almost 70% of the special area Kufri comes under Eco-Sensitive zone due to weak rock structures, sensitivity of sub-soil, endangered forests and wild life. Some parts of the Kufri and Ghanatti special area has been declared as restricted areas and only need based constructions are allowed in these areas. As far as growth of the town is concerned, for that an activity zone has been delineated comprising some parts of special area Ghanahatti and Shoghi for the further growth of the town. So at present, we can say that there is only one direction i.e. westward for the further growth and development.

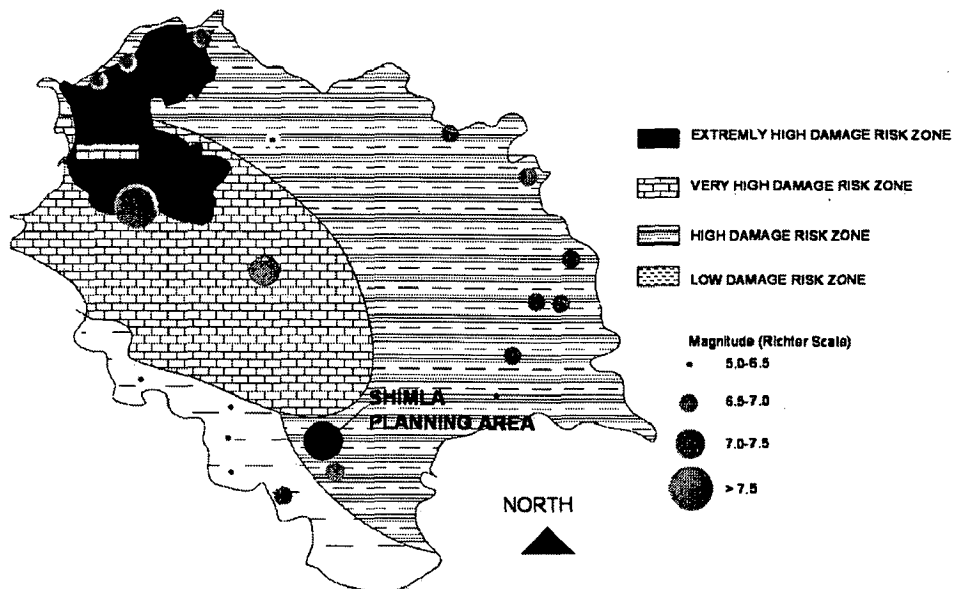
**Fig. - 6.1 : Spatial Zonation of Shimla**



Source : Town and country planning Department

Being located in seismic zone – IV i.e. High Damage Risk Zone (fig.-6.2), it is susceptible to earthquakes. It has been anticipated that it is susceptible to earthquake of 6.5 – 7.0 points on Richter scale.

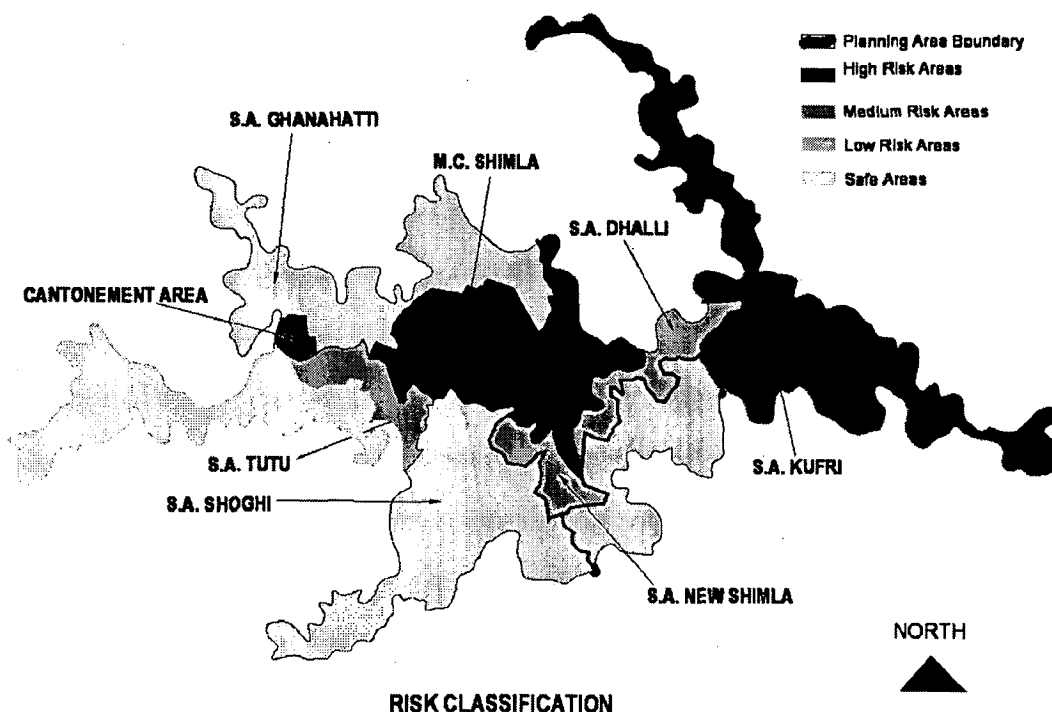
**Fig.- 6.2 : Earthquake Zoning of Himachal Pradesh**



Source : Town and country planning Department

The recent two decades of organic growth, on account of overwhelming urbanization forces resulted into eyesores on the townscape of Shimla, which

**Fig. - 6.3 : Risk Classification of Shimla**





may emerge death traps in the event of natural calamities like earthquakes, cloudbursts and landslides, for which the area is highly susceptible. As the city is now continuously growing, it has posed colossal environmental threats. Considering above mentioned threats entire Shimla can be classified into various risk zones as shown in fig.- 6.3.

Constructions carried on slopes are more dangerous. Even 45° slope is more than tolerable limits in order to cope up with the gravity of geo-hazards like earthquakes, landslides and dislocation of buildings. But many localities have come even on slopes greater than 45 deg. As shown in table – 6.1.

The following table shows requirement of natural state with the increase of slope:-

#### 6.6.1 Slope density provisions

**Table – 6.1: Average slope v/s % of site to remain in Natural State**

Average Slope (%age)	%age of site to remain in Natural State
10	32
15	36
20	45
25	55
30	52
35	90
40	100

Source : Building Bye laws, Town & Country Planning Act, 1959.

Localities like Cemetery, Sanjauli, Jiunu Colony, Chakkar, Katchi Ghati and Lower Bharari are susceptible to major mishaps during earthquakes whereby chain effect of collapse of building may affect many buildings on slopes down below.

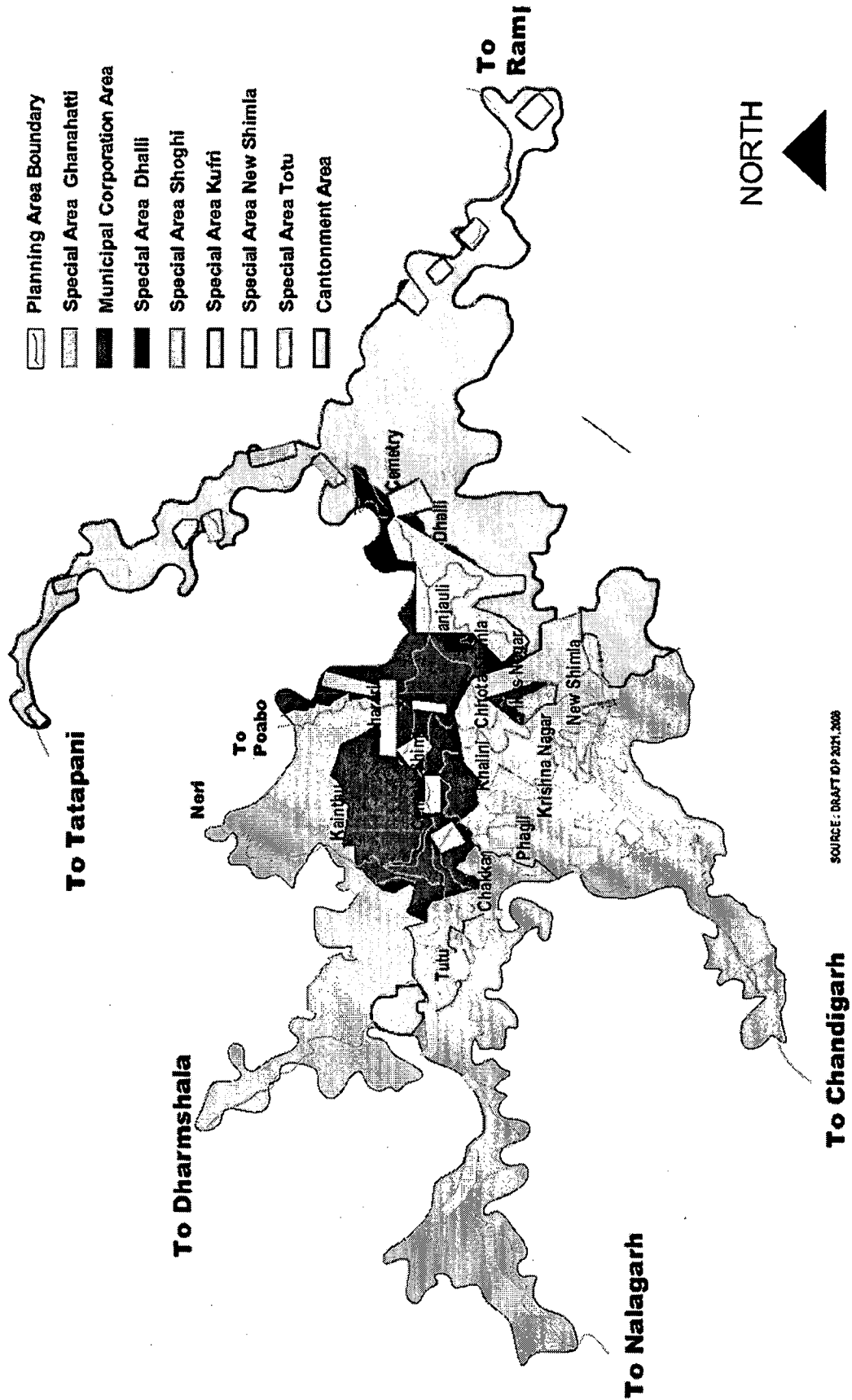
**Table - 6.2: Havoc potential of constructions in major localities.**

Locality	Average Slope	Coverage	No. of Storeys	F.A.R of locality	Peak Density of Population (Per hectare)
1.	2.	3.	4.	5.	6.
Dhalli	50 <sup>0</sup>	60%	4	3.0	2500
Cemetery	50 <sup>0</sup>	85%	4-5	3.5	3000
Sanjauli	50 <sup>0</sup>	50%	4-5	3.0	2500
Jiwanoo Colony	60 <sup>0</sup>	85%	4-5	3.5	3000
New Shimla	35 <sup>0</sup> -45 <sup>0</sup>	50%	4	2.5	2000
Vikas Nagar	30 <sup>0</sup> -40 <sup>0</sup>	60%	4	2.5	2000
Khalini	45 <sup>0</sup>	65%	4-5	2.5	2000
Chhota Shimla	45 <sup>0</sup>	65%	4-5	2.5	2500
Central Shimla	60 <sup>0</sup>	90%	4-5	4.0	3500
Krishna Nagar	50 <sup>0</sup>	50%	2-3	1.5	2000
Bharari	50 <sup>0</sup>	50%	4	2.5	2000
Kaithu	45 <sup>0</sup>	60%	4	2.5	2000
Phagli	60 <sup>0</sup>	50%	4	2.0	2000
Chakkar	65 <sup>0</sup>	60%	4-5	3.0	2500
Katchighatti	55 <sup>0</sup>	80%	5-6	4.0	3000
Totu	50 <sup>0</sup>	55%	4-5	3.0	2500

Source : Town & Country Planning Department

In such a situation, the strength of any individual building amidst the maze of weak and multi-storeyed buildings is likely to make a tangible difference. Utmost discipline in construction activities in accordance with ecological imperatives and to allow construction on limited slope, is the present day concern. In view of empirical observations of various important localities, havoc potential thereof has been assessed for densely populated localities and the same is given in table 6.2.

Map.- 6.1 : Location of Residential Colonies



Following things can be deduced:-

(i) Likely devastation during earthquake on slopes of more than  $35^{\circ}$  to  $40^{\circ}$  will multiply due to chain effect.



**Visual 6.6: Massive Construction in Cemetery without proper Accesses**

(ii) High percentage of coverage with no tree/ greenery amidst congested localities and utmost disregard to natural drainage and cleanliness may cause pollution menace and casualties in fire.

(iii) More number of storeys coupled with high FAR and coverage and thereby no light, air and ventilation may lead to environmental chaos and thereby affect human health.

(iv) High peak density of population may lead to more casualties during earthquake. As localities are thickly built with utmost disregard to roads, setbacks etc., no relief and rescue operations can be carried.

The localities of Sanjauli, Summerhill, Dhalli, Kasumpti, Shoghi, Totu and Ghanahatti have become concrete jungle, leading to deterioration of environs. The Municipal Area has been dotted with slums and hutments of construction workers, even amidst the forest areas.

The localities which are susceptible for geo-hazards including likely devastation during earthquakes, landslides, collapse of buildings due to local disturbances, cloud bursts etc. should be identified and all remedial measures be taken by the organizations including Development Authority, Municipal Corporation, Town and Country Planning Department and Revenue Department, so that there is no threat to human lives in these areas.

**6.6 ENVIRONMENTAL POLLUTION**

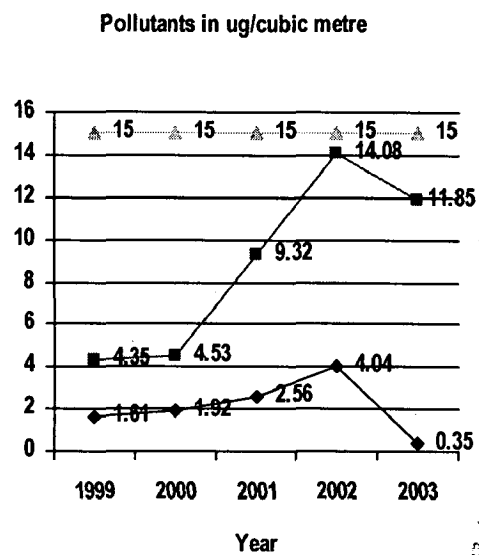
Quantum of pollutants is increasing in the city due to massive toxics emerging from the various unmanaged sources. The air is contaminated with different pollutants such as SO<sub>2</sub>, Nox and SPM. As per records of State Environment Protection and Pollution Control Board existing quantum of pollutants is given below-

**Table – 6.3: Pollutants in Resi. Areas**

Year	Pollutants (Ug/m <sup>3</sup> )		Standard (ug/m <sup>3</sup> )
	SO <sub>2</sub>	Nox	
1999	1.61	4.35	15
2000	1.92	4.53	15
2001	2.56	9.32	15
2002	4.04	14.08	15
2003	0.35	11.85	15

Source: H.P SEP& PCB

**Fig.- 6.4: Pollutants in Resi. Areas**

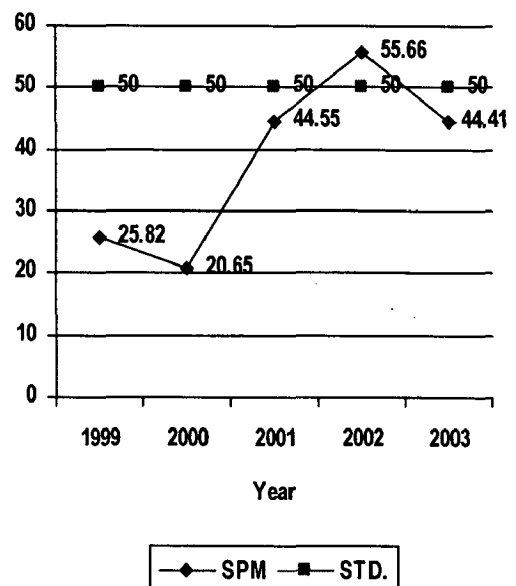


**Table – 6.4: Concentration of SPM**

Year	SPM (ug/m <sup>3</sup> )	(Standard (ug/m <sup>3</sup> ))
1999	25.82	50
2000	20.65	50
2001	44.55	50
2002	55.66	50
2003	44.41	50

Source: H.P SEP&PCB

**Fig 6.5: Concentration of SPM**



The National Ambient Air Quality Standard (NAAQS) has setup a norm of 15 and 50  $\mu\text{g}/\text{m}^3$  respectively at residential area, but table reveals that quantum of such toxic trends are mushrooming over city as a whole. As a resultant, there is ill effect on various systems of human settlement and ecology. Similarly, concentration of Suspended Particular Matter in residential area is increasing at faster rate (Table 6.4). The level of pollution in commercial areas is also increasing and the same is shown as under:-

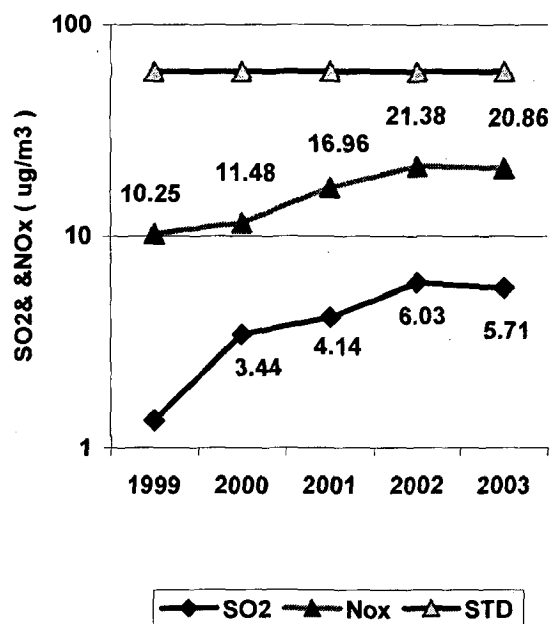
**Table – 6.5 : Pollutants in Comm. Areas**

Year	SO <sub>2</sub>	Nox	STD ( $\mu\text{g}/\text{m}^3$ )
1999	1.349	10.25	60
2000	3.44	11.48	60
2001	4.14	16.96	60
2002	6.03	21.38	60
2003	5.51	20.86	60

Source: H.P SEP&PCB

**Fig. - 6.6: Pollutants in Comm. Areas**

Growing pollutants in Commercial area

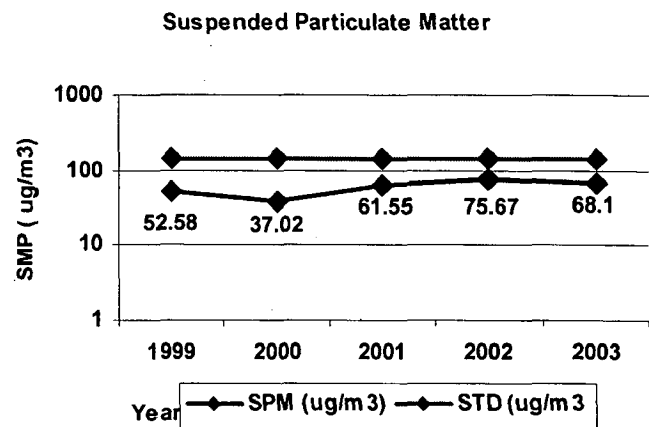


The table shows that existing quantum of SO<sub>2</sub> and Nox pollutants are increasing in commercial areas, due to multifold increase of commercial activities in and around the city. Permissible limit of SO<sub>2</sub> & Nox is 60  $\mu\text{g}/\text{m}^3$  in commercial areas as per the NAAQS norm. In addition, Suspended Particular Matter is increasing at faster rate as against norms of 140  $\mu\text{g}/\text{m}^3$  as given below in table – 6.6

**Table 6.6: Suspended Particular Matter**

Year	SPM (ug/m <sup>3</sup> )	Standard (ug/m <sup>3</sup> )
1999	52.58	140
2000	35.02	140
2001	61.55	140
2002	55.65	140
2003	68.1	140

**Fig. – 6.7: Suspended Particular Matter**



Source: H.P SEP&PCB

**6.7.1 Noise Pollution**

Noise pollution is also increasing as against the given norms of 55 dB for day and 45 dB for night at residential locality. In commercial area same level is 65dB for day and 55 dB night as given below -

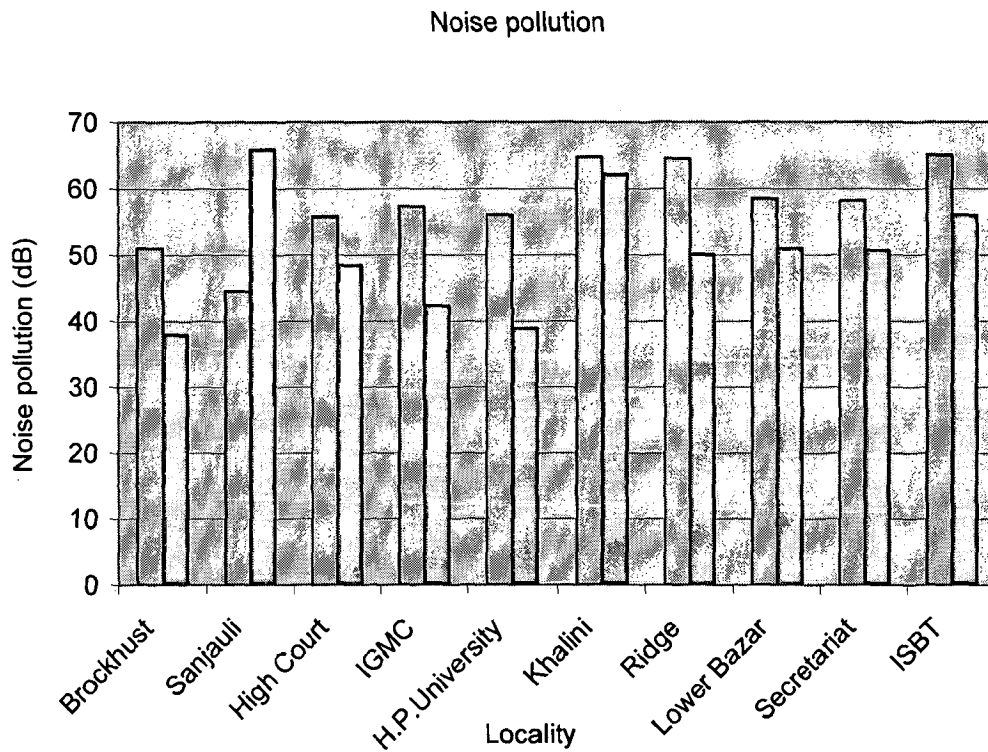
**Table – 6.7: Noise pollution level**

Area	Day	Night	STD (dB)	
<b>Residential</b>				
Brockhust	51.1	38.05	Day	55
Sanjauli	44.6	65.9	Night	45
<b>Silence Zone</b>				
High Court	55.8	48.5	Day	50
IGMC	55.3	42.4	Night	40
H.P.University	56.0	38.9		
<b>Commercial area</b>				
Khalini	64.8	62.2	Day	65
Ridge	64.6	50.2		
Lower Bazaar	58.5	51.0	Night	55
Secretariat	58.2	50.5		
ISBT	65.1	56.0		

Source: SEP & PCB

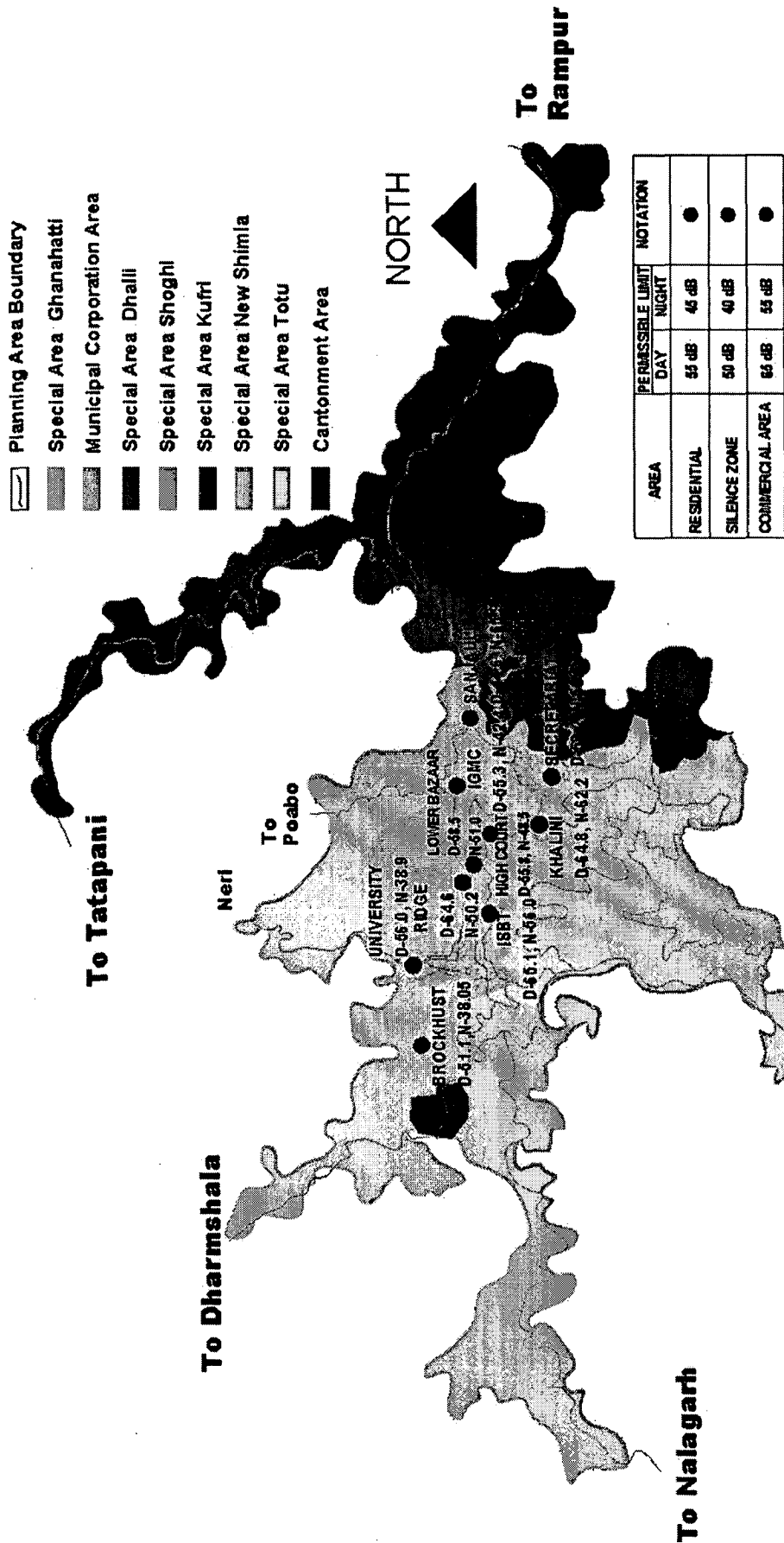


**Fig. – 6.8: Noise pollution level**



Noise pollution is exceeding as against the given norms at night and day time as given in (Table - 5.5) for localities, due to massive concentration of residential and commercial activities. The highest noise level is recorded in ISBT area followed by H.P Secretariat area. In addition, noise level is also high in city commercial areas like Lower Bazaar, Lakkar Bazaar, Sanjauli and Khalini localities.

Map.- 6.2 : Location of Areas Exceeding Noise pollution limits



SOURCE : DRAFT IDP 2021, 2008

## **6.7 OTHER TYPES OF POLLUTION**

Water is also not of good quality as per norm due to waste and toxic suspended material over ground. Water is also contaminated by sewerage and drain wastewater. The aging drainage and sewerage system has become a nightmare for residents of central Shimla. The faulty pipe lines are posing threats. The entire municipal area and potential locations along highways are witnessing haphazard growth in absence of proper services infrastructure including accesses, water supply, sanitation, electrification and open spaces. On account of limited road width and as a resultant of manifold increase in number of automobiles and regional heavy traffic, entire peace and tranquility of the city has been disturbed. Traffic jams, bottlenecks, delays and accidents have become common. The problems in peak hours of morning and evening are severe. Besides wastage of man-hours, lot of fuel is wasted and air is polluted. As there is no scope for expansion of roads in central areas due to prevalence of structures on both sides, traffic problems have multiplied.

The city lacks proper drainage system. Most of the drains are open. Haphazard transactions of land, encroachments on drains and inadequate width of streets have led to a chaotic situation. On account of damage of drains by builders of houses and unauthorized cutting of land, the drainage system is frequently disrupted.

## **6.8 INFERENCES**

Shimla, used to be known for its cleanliness, natural environs, heritage masterpieces, scenic beauty and commanding view of the mighty Himalayas. But many problems have cropped up due to increasing pollution, environmental degradation and ruin. At this point, no more degradation be allowed to take place.

Overall green cover needs to be enhanced by mobilizing the masses. The plantation should be made mandatory. There must be blanket ban on cutting of trees. Its physical deterioration has to be dealt by paving way for detailed local level and problematic area plans and their implementation by community participation on the lines of sustainable development approach suggested by UNCED. An utmost discipline in carrying out construction activities in accordance with physical, environmental and ecological imperatives is the foremost necessity. Energy efficient solar passive housing be encouraged in the city. Discipline is also required in the disposal of debris at earmarked sites, so that the same neither harms tree cover nor goes down to the streams. Besides, statutory duty, it is the responsibility of Development Authority, Municipal Corporation, Shimla, Environmentalists, Spatial Planners to protect it for tourists, safeguard its beauty and take remedial measures to pave way through regulatory control along to restore its basic character and make it efficient, viable, healthy, wealthy and vibrant city.



# **CHAPTER - 7**

## **ANALYSIS OF PHYSICAL INFRASTRUCTURE**

**7.1 Physical infrastructure**

**7.2 The carrying capacity**

**7.3 Water supply in Shimla**

**7.4 Sewerage system**

**7.5 Solid waste**

## 7. ANALYSIS OF PHYSICAL INFRASTRUCTURE

### 7.1 PHYSICAL INFRASTRUCTURE

Physical infrastructure may be defined as facilities and services, which are essential for proper functioning of the city. As we know that physical infrastructure is the bedrock of any city or town, it becomes essential that adequate level of physical infrastructure is planned and maintained for the overall well being of the city. Physical infrastructure is one of the most important parameter of the sustainability. Without adequate level of infrastructure, sustainability of any settlement can not be ensured.

Physical infrastructure can be divided into following categories as-

1. Water Supply
2. Sewerage
3. Waste disposal

As far as Shimla city is concerned, water supply of main concern out of other physical infrastructure of the city due to the limited water resources in the vicinity. This is the only factor which could inhibit the growth of the city in future. Therefore it becomes essential to work out water based carrying capacity of the Shimla city. Though other physical infrastructure has been be studied in detail but carrying capacity analysis has been conducted for water supply only.

### 7.2 THE CARRYING CAPACITY

Carrying capacity may be defined as the *"Maximum population that can be supported indefinitely in a given habitat without permanently impairing the productivity of the Ecosystem upon which the population is dependent"*

According to UNESCO, *"It may be defined as number of people sharing a given area or territory who can for the foreseeable future, sustain the existing standard of living through the utilization"*

### **7.2.1 Carrying Capacity & Mountain areas**

Mountain areas have certain objective conditions or "specificities" (Jodha 1989), and it is within the perspective of these conditions that all activities and development interventions have to be assessed (Jodha and Shrestha 1993) to ensure that they contribute to sustainable development. Among the major objective conditions prevailing in the mountains, are the fact that mountains are generally inaccessible, fragile and diverse. These conditions have definite implications for development activities in mountains. Inaccessibility, for example manifests in isolation, remoteness, restricted linkages with outside world and therefore high transport costs.

Sustainable development in such areas has to ensure that maximum advantage is taken of relative inaccessibility and efforts are made to allow for local resource-focused development, both in an economic and in environmental sense. Sustainable development in this context need to be seen as a mechanism for safeguarding and regulating resource use for the benefit of mountain communities.

In a mountain context, carrying capacity with respect to sustainable development is essentially an attempt to define the level of tolerance or compatibility between development activities, demands and the ecological, social, cultural and economic support system of the area to meet these demands.

The notion of carrying capacity presumes that there is always an upper limit beyond which sustainable use of resource is not possible and therefore, it is



necessary to protect, conserve and manage these resources so that the attributes and values that are intrinsic to the environment and society are not destroyed and their quality diminished.

### **7.2.2 Approaches to Carrying Capacity Analysis**

Carrying capacity of an area or region may be seen as a function of a number of variables such as:

- Natural resources
- Mountain specificities
- Development activities
- Infrastructural facilities
- Management of resources
- Attitudes and behaviors

At settlement level, the carrying capacity is based on following factors such as –

1. Land availability and Intensity of development.
2. Physical infrastructure.
3. Transport facilities (Connectivity of different land uses).

However, there are many difficulties in quantification of Carrying Capacities due to heterogeneity of Environment, interplay of economic and social factors in the Human Environment and subjectivity in living standards

Sustainability with respect to water is the utilization of water resources in a judicious manner for the present generation and at the same time recharging the source of water for the use of future generations. Sustainability with respect to water depends upon three main factors:

1. Quantity of water available and its recharge
2. Quality of available water

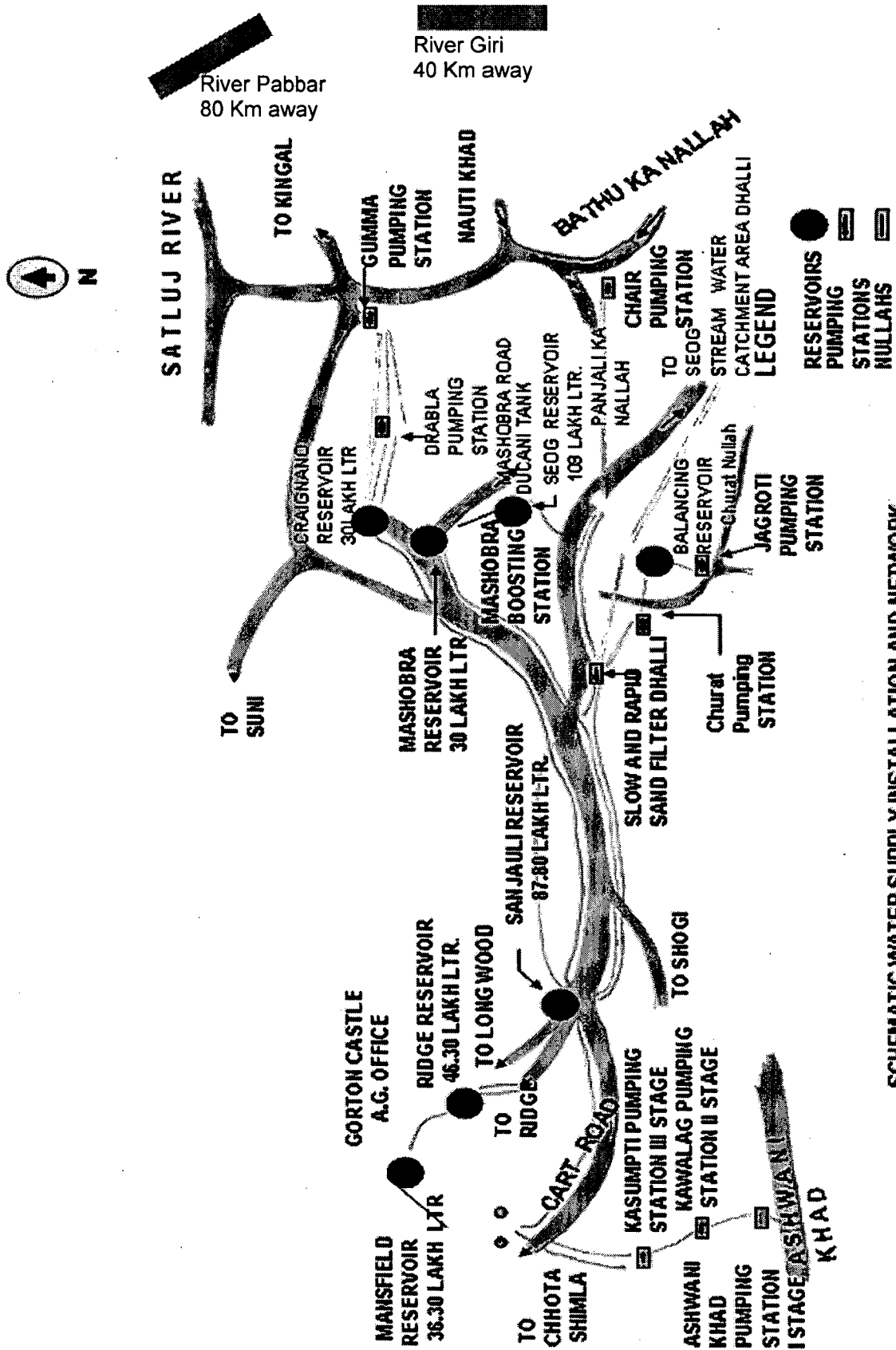
### 3. Present and future demand

Quantity and quality of water available to meet the existing as well as future demand of a settlement is an important parameter for working out the carrying capacity of a region or city with respect to water source and its supply network etc. Therefore, it can be said that for sustainable development of a region carrying capacity of water resources based on its distribution becomes a very good tool for the process of city planning.

#### **7.3 WATER SUPPLY IN SHIMLA**

Water is a vital resource with finite capacities and for sustainable water supply it should be recharged regularly. Water supply in Shimla mainly depends on the surface sources like springs, nallahs or streams for its water demand. First water supply system of Shimla was established in 1875 to serve the population of 20,000 and the first reservoir of 9 ML capacity was constructed at Sanjauli in 1884 for systematic supply. Water demand for Shimla city is met from bulk water supply which is subsidized from by Irrigation & Public Health (IPH) department. IPH department has set up pumping stations at five locations viz. Dhalli catchment area, Churat Nallah, Chair Nallah, Nauti Khad and Aswhani Khad (Map – 7.1).

Map - 7.1: Water Supply Network



Source: IPH Department, Division no.-1, Shimla

About 39.21 MLD water has been tapped from these sources however, these sources have a total installed capacity of 45.96 MLD (Million Litter per day). Total intake from above sources is given in table – 7.1 below-

**Table – 7.1: Details of sources of water for Shimla City**

Sr. No.	Source name	Transmission Type	Year of Start	Installed Capacity	Quantity of Water Produced (MLD)	Supply to Shimla Municipal Corporation (MLD)	
						Non lean	Lean Period
1.	Dhalli Catchment Area	Gravity	1875	4.54	1.80	0.23	0.20
2.	Cherot/Jagroti Nallah	Pumping	1914	4.80	3.86	3.86	2.65
3.	Chair Nallah	Pumping	1914	2.5	3.0	2.5	1.42
4.	Nauti Khad (Gumma)	Pumping	1924	24.06	19.75	24.06	16.80
5.	Ashwani Khad	Pumping	1992	7.06	7.80	7.80	6.3
	Sub –Total			45.96	39.21	41.45	27.37
6.	Tube Wells – 7 nos.						2.63
	<b>Total</b>						<b>30.00</b>

Source: IPH Department, Division no.-1, Shimla

It can be seen from above table that, Nauti Khad source contributes 19.75 MLD followed by Ashwani Khad 7.80 MLD. Dhalli catchment, Chair and Churat nallahs collectively contribute 8.66 MLD. These sources are situated in different directions of Planning Area as shown in figure-01. City has mainly 11 reservoirs (Fig.- 01), which cater for water needs of about 1.42 lakh persons in municipal

corporation area as well as adjoining 32 thousand population of the Planning Area. Reservoirs are spatially distributed in and around the Municipal Area as well as in Planning Area. Total capacity of these reservoirs is 36.92 MLD as shown in table 7.2 below.

**Table - 7.2: Existing Reservoirs and their capacity.**

Sr. No.	Reservoirs	Capacity (MLD)
01	Carignano	3.0
02	Sanjauli	8.78
03	Ridge	4.63
04	Mansfield	3.63
05	Mashobra	3.00
06	Seog	7.9
07	Kasumpti	2.00
08	Kasumpti	0.22
09	Vice Regal Lodge	0.23
7	Jakhu	0.32
11	Boileauganj	0.24
	<b>Total</b>	<b>36.92</b>

Source : Deptt. of IPH Division II, Shimla

Though, Capacity of reservoirs has been installed in accordance with population size and commercial activities of earlier times, but today due to the increase in population and other activities water demand has been enhanced and the existing water supply scheme is not able to fulfill even the present demand.

### 7.3.1 Treatment of water

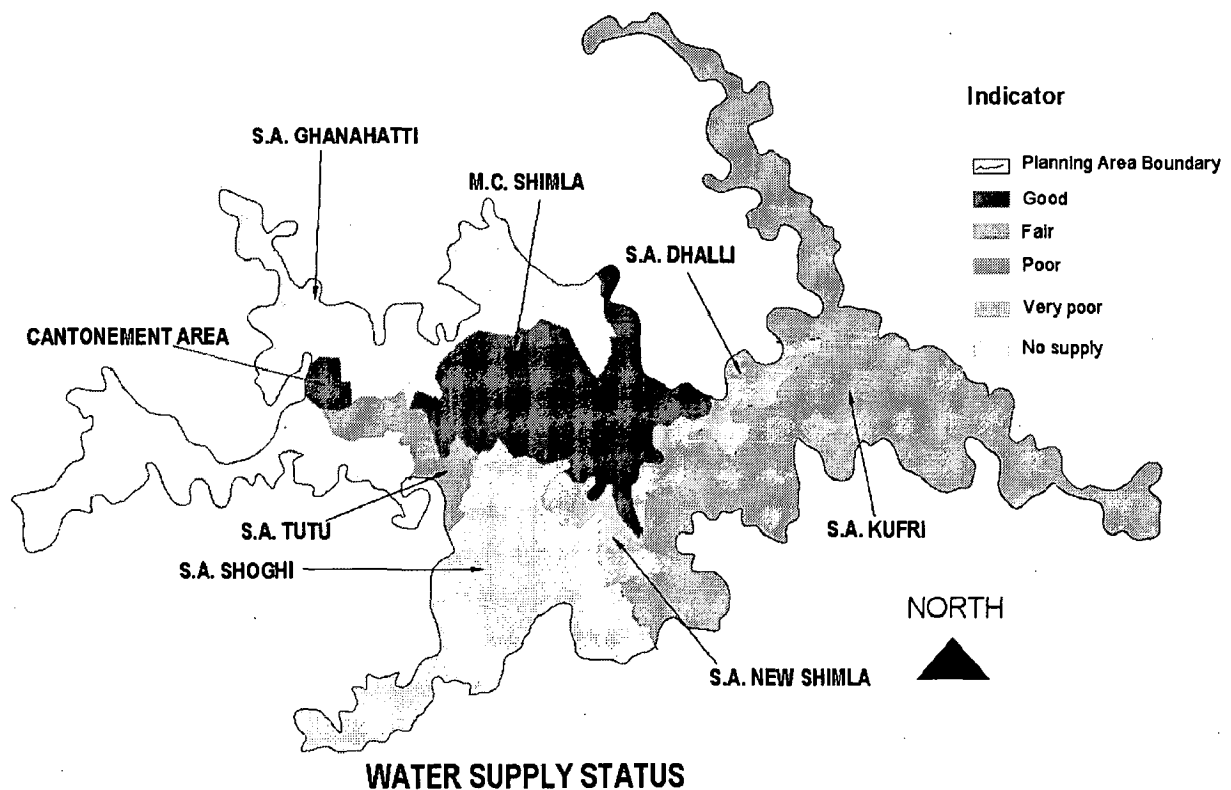
Water lifted from all the five main sources is treated at sources with rapid sand filters and chlorination before transmission. The treated water sample indicates the pH value (6.5) is within safe range for drinking purposes. Therefore physical – chemical quality of water is safe for drinking purposes.

**Table - 7.3: Water Supply Performance Indicators**

Sr. No.	Indicator	Current Situation
1.	Per Capita Supply (LPCD)	75
2.	T & D losses / Total Supply	>30%
3.	Supply Frequency	45 minutes every day

Source: City Development Plan by IL&FS.

Overall water supply performance in Shimla city can be termed as very poor as shown in table – 7.3. On average water is supplied at the rate of 75lpcd for 45 minutes daily. Situation is so grim that sometimes during peak seasons water is not supplied for continuous three days. Special area Ghanahatti does not have proper water supply network as shown in fig.-7.1.

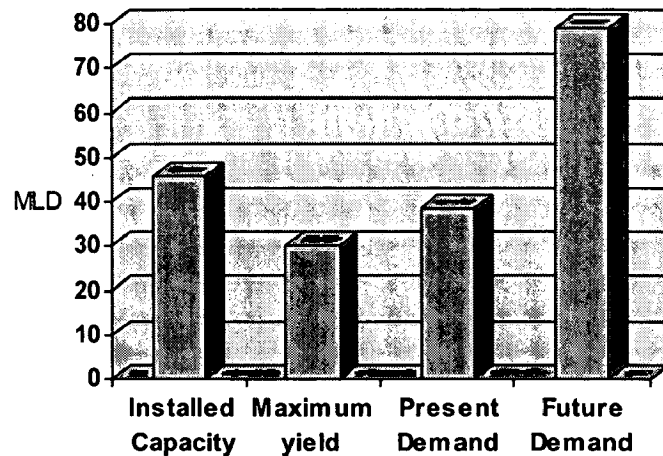
**Fig. - 7.1: Water Supply Status in various areas**

Source : Author after consultation with IPH officials

### 7.3.2 Demand and Deficit

Fig. – 7.2: Water Demand & Deficit

The present water requirement per day for Shimla City during peak tourist season for the resident population of 1,74,000 and floating population of 56,000 @ 135 and 70 lpcd respectively is 39 MLD as against the supply



of approximately 30 MLD. Thus there is a deficit of water supply of about 9 MLD, which doubles to about 18 MLD during summer because of failure of snowfall or rain in winters. The installed capacity of water supply system is 45.97 MLD against present availability of water intake sources of 39.21 MLD.

Table – 7.4: Future Water Requirement (2021)

Sr.No.	Sector	Demand of water ( in MLD )	
		2004	2021
1	Residential area	24.50	39.00
2	Commercial area	0.71	4.7
3	Institutional area	1.4	5.51
4	Industrial area	1.2	5.1
5	Fire fighting	1.32	4.6
6	Floating Population	8.07	15.57
	<b>Total</b>	<b>38.4</b>	<b>78.77</b>

Source: Department of I PH, Shimla

It is anticipated that if population growth rate remains constant population will increase to about 3.20 lakh persons for the year 2021. So, water supply is

inadequate to urban residents of Planning Area due to rapid growth of population. Existing water supply is also not sufficient to rural settlements and water for these settlements is managed through local natural sources i.e 'Baulies', springs and nallah's which have also been tapped for various Government water supply schemes.

As far the present water requirement of 39 MLD required the IPH department is able to supply only 30MLD water @ 75 lpcd. The future demand @ 135lpcd comes to be 78.77 MLD and considering the availability of 30MLD the shortfall of water supply for 2021 will be 48.77MLD (Table – 7.4 ) which indicates a huge gap between the existing carrying capacity of the water supply system and its future requirements. Thus, there is an urgent need to take some drastic steps to improve and augment the water supply schemes in Shimla, so as to save city from any critical situation by the year 2021.

### **7.3.3 Potential Sources of Water to the City**

In order to cater water requirement of the city by the year 2021 reliable water sources like Giri river, from which about 20 MLD can be tapped to augment the existing water supply system. River Pabber is also a future water source from where about 52 MLD water can be tapped (Map – 7.1). Though water can be tapped from the Sutlej also but treatment cost will be very high due to high silt content. It will be pertinent to undertake detailed feasibility study for tapping water from these sources for project formulation & implementation. Considering the present condition of water supply in Shimla, it has also become imperative to adopt rainwater harvesting techniques and water conservation strategies to cater for the future requirements. Simultaneously, losses, which are nearly 30%,



should be checked immediately by adopting best practices.

operation and management

### 7.3.4 Inference

After analyzing the data it can be concluded that considering the total availability of water, which is around 30 MLD to the city as against the present requirement of 38.4 MLD, city has already exceeded its carrying capacity. There will total requirement of 78.77 MLD in 2021 for the population of 3.2 lakh persons. Hence there will be total deficit of 48.77 MLD in 2021. This deficit can be compensated by the two potential sources i.e. river Giri & Pabbar, which have combined intake capacity of 72 MLD. Surplus 23.33 MLD from above mentioned two potential sources may be used for emergency situations and it can act as buffer stock during peak demand. Considering the non-availability of other sources of water in the vicinity and present pressure on the water supply network, it is suggested that population of 3.2 lakh be considered as critical population and be fixed as max. Water based carrying capacity of the city.

## 7.4 SEWERAGE SYSTEM

Sewerage system is an essential urban utility and forms an integral part of environmental character of the city. Sewage treatment facilities of Shimla have been substantially improved over the years to cater the future demand. Sewerage system for Shimla was designed for a population of 18000 persons in 1880. The system continued for around 70 years without any augmentation. Population in the intervening period increased to about 1,50,000. As a result, system has become grossly inadequate. Therefore, due to excess load certain portions have led to frequent leakages, causing environmental hazards and pollution. The State Government has now taken steps to modernise the system to manage the

city sewage and sullage efficiently for congenial environment of Shimla city. This milestone has been achieved by the financial patronage of OPEC and State Govt. Therefore, the city has now systematic and properly designed sewerage system and most areas of Municipal Corporation are covered with necessary sewerage networks.

#### 7.4.1 Existing sewerage system

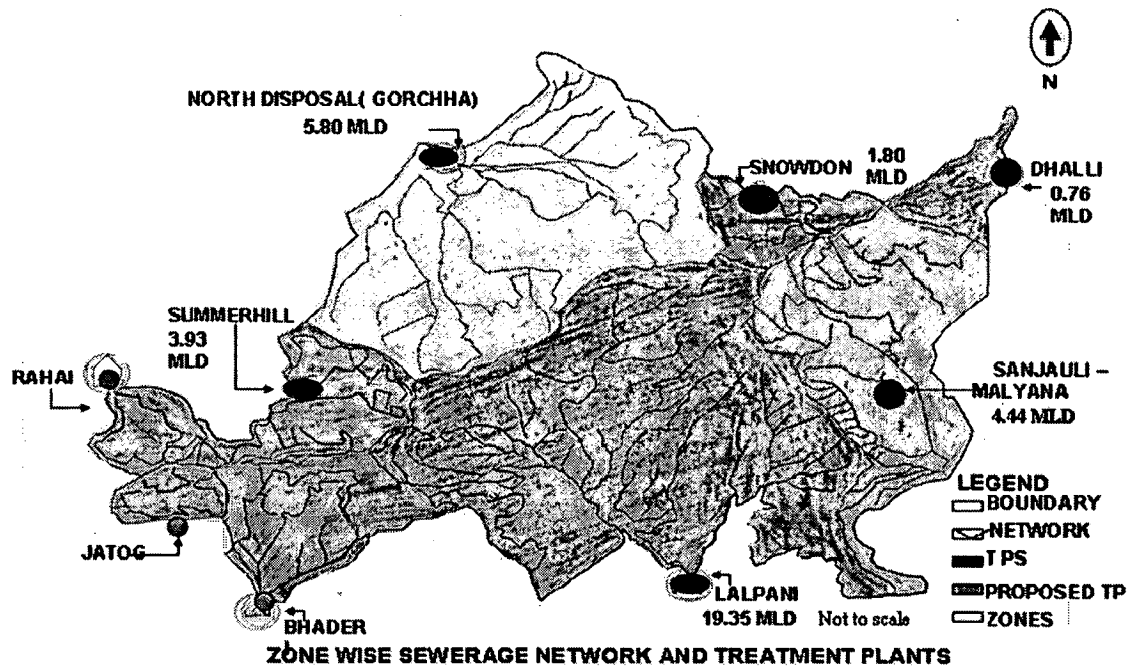
As per City Sewerage Division, 192.7 km. long sewerage networks have been laid down in the entire urban area. Sewerage Treatment plants have been installed at strategic locations namely, Lalpani, Dhalli, Sanjauli, North Disposal, Snowdon and Summer hill, having gross capacity of 36 mld. Sullage is also carried through sewer lines to the Treatment Plants. Zone wise Sewerage Treatment Plants are as in table – 7.5 & shown in fig.-7.3.

**Table – 7.5: Zone wise Sewerage System and Treatment Plants**

Sr. No	Location of Sewage Treatment Plant	Capacity in Mld
01	Lalpani	19.35
02	Dhalli	0.76
03	Sanjauli & Malyana	4.44
04	North Disposal (Golcha)	5.80
05	Snowdon	1.80
06	Summer hill	3.93
	<b>Total</b>	<b>36.08</b>

Source: Sewerage Division, IPH Deptt., Shimla

Fig. – 7.3: Zone wise Sewerage Network



Source: Sewerage Division, IPH Deptt., Shimla

Lalpani zone caters for half of the city population. It has a capacity of 19.35 mld. North disposal (Golcha) zone has capacity of 5.80 mld. Besides, treatment plants have also been proposed at Sanjauli and Malyana with a capacity of 4.44, mld. Keeping in view, the present as well as future population growth, Sewerage Treatment Plants have been proposed by sewerage division of IPH at Tutu, Rahai, Jatog & Bhader.

Table – 7.6: Performance Indicators

S. No.	Indicator	SMC Area	Dhalli, Tutu, New Shimla	Special Areas of Ghanahattii, Kufri and Shoghi
1.	Network Coverage	90%	No coverage	No coverage
2.	Access to Sewerage	80%	No access	No access
3.	Total Quantity Generated	4.80 MLD	-	-
4.	Capacity of treatment Plants	35.63	-	-

Source : City Development Plan by IL&FS

### 7.4.2 Inferences

Considering present status of sewerage system, it can be seen that present system is only catering to the SMC area and that too coverage is 90%. It can be clearly seen that sewerage network has not been provided in SADA areas. Though the treatment plants have been proposed in some of the SADA areas, but till date no sewerage network exists in these areas. So carrying capacity of the sewerage network is sufficient to cater to the present population though proper network is yet to reach in some planning areas. In 2021 total water demand would be 78.77 MLD. Sewerage produced would be 80% of the water demand i.e. 63MLD. So the current capacity of treatment plants is falling short by 27.37 MLD. So it becomes essential to increase the capacity of present treatment plants or establishing new treatment plants, simultaneously spreading the network to all planning areas. To meet this demand seven treatment plants have been proposed by IL&FS in various areas after studying the density pattern of various areas. These treatment plants should be installed as soon as possible.

### 7.5 SOLID WASTE

Once known for cleanliness, Shimla has presently become a dirty city. Shimla city generates 60 to 75 tons garbage per day, out of which only 50% is collected and managed by the Municipal Corporation. It has provided dustbins and dumpers for the collection of waste at different places in the city. Only the Mall



**Visual 7.1: Throwing of solid waste down the hill slopes**

and the Ridge are cleaner areas. Remaining areas predominantly residential localities namely, Subzi Mandi, Lower Bazaar, Jakhu, Kaithu, Sanjauli, Kasumpti, Boileauganj and Summer Hill are witnessing acute garbage problem. Sanjauli locality is a dense residential area and is not under effective management of solid waste system causing environmental problems and nuisance to residents.

Shimla Municipal Corporation is responsible for collection, transportation, treatment and disposal of solid waste in SMC limits, while SADA is responsible for SWM services in their respective special areas. However, SMC is providing collection and transportation services in few SADA areas also.

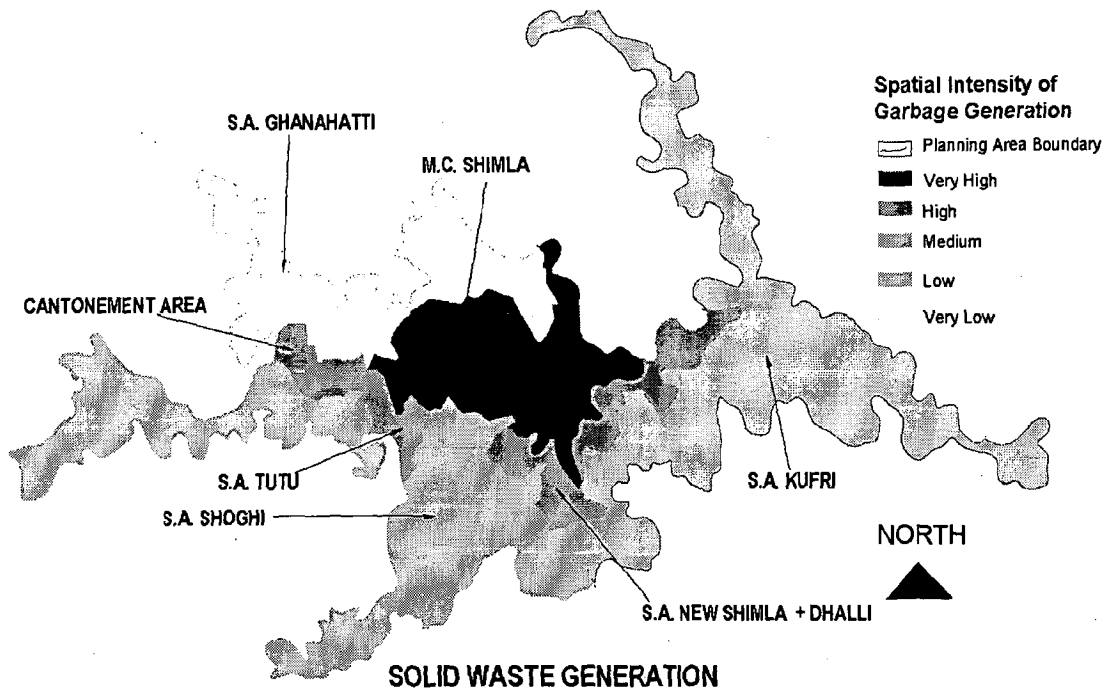
#### 7.5.1 Generation

The average generation in Shimla Planning Area is estimated to be 75 T per day @ average of 0.43 kg per capita per day generation (Table-7.7). The generation is characterized by high level of seasonal variations with 30% increase in peak season. Generation of the solid waste is very high in Municipal area as compared to the other areas as shown in fig. – 7.4.

**Table – 7.7: Solid waste generation and projection**

S.N	Year	Population	Solid Waste Generation (T per day)
1	2001	174789	75
2	2006	203091	87
3	2011	235970	71
4	2016	274185	118
5	2021	318560	137

Source : City Development Plan by IL&FS

**Fig. - 7.4: Solid Waste Generation Status in Various Areas**

Source : Author after consultation with IPH officials

The solid waste projections for planning area are presented in Table No. 7.7. The characterization of solid waste from Shimla indicates that 65% of the waste is organic waste. Balance constitute paper, metals, glass, textiles, plastics and polythene and other debris.

### 7.5.2 Collection

The Solid Waste collection is about 35-40 T/day amounting to collection efficiency of about 40 to 46%. The collection of solid waste is primarily through community bin system comprising of 142 dumper containers and 209 concrete dustbins and some other types. Frequency of clearing of bin varies from daily to alternate day to twice in week depending on area. Bin: Population ratio varies between 1:132 and 1: 898.

Collection is also carried out through street sweeping. SMC area has 142 km length of road. Street sweeping in SMC is carried out through 405 sanitation

workers of SMC. The road length covered per sweeper is about 350m as against the national average of 1-1.5 km. The collection is carried out using Suphli and baskets and transportation of street sweepings to nearest community bin is carried out using nylon bags. Sweeping is also carried out through private sweepers on Sundays and holidays in the heart of the city i.e. Mall Road, Lower Bazaar, Sabji Mandi, Lakkar Bazaar etc.

Recently Shimla Municipal Corporation has introduced Door-to-door collection (D2D) scheme under HP Municipal Corporation Act 1994 in selected areas through Private Sector Participation. Shimla Municipal Corporation has introduced a bylaw on D2D collection in August 2006. About 30-35% population within SMC is covered under D2D scheme. SMC has notified the tariff for D2D solid waste collection for contracted areas and is envisaging to select D2D Operators for remaining area based on tariff based bidding process.

### **7.5.3 Transportation**

Transportation of waste is carried out mainly through dumper placers and tipper trucks. About 14 vehicles are utilized for transportation of waste, which includes 7 dumper placers, 3 tippers and 1 truck. The average distance to be traveled to disposal site by transport vehicles is 14 km. Of the 14 vehicles available with SMC for transportation, 4 vehicles are more than 7 years old and 6 vehicles are more than 8 years old. Transportation of waste is done in single shift with dumper placer making 6-8 trips and tipper only making 1 trip in a shift. The ratio of number of dumper containers to number of dumper placers is 14. Only 25% of the dumper containers are lifted in day. The cost of transportation is estimated to be Rs. 250 /T excluding manpower cost.

#### **7.5.4 Processing and treatment**

SMC has commissioned a solid waste processing and treatment plant of 70 T/day capacity at the cost 3.72 Cr in 2001 at Darni-ka-Bagicha in Lalpani. The treatment is based on Excel aerobic composting technology. The plant receives about 912 T per month wastes during normal season and 1266 MT per month wastes during peak season amounting to 30-45 t/day. The amount of compost produced is about 15-20 MT per month.

SMC has established common biomedical waste treatment facility comprising of incinerator for treatment and disposal of biomedical wastes. In absence of autoclave shredder and burial pits, the facility is not able to provide a complete treatment and disposal for all types of biomedical wastes.

#### **7.5.5 Disposal**

The disposal is carried out through open land filling along the hill slopes near the processing and treatment plant. About 1200 sq.m. area is being used for land filling. About 170-300 MT per month of inert material from processing plant (which amounts to 18%-22% of total waste received) is disposed at landfill site. The construction wastes and debris which is collected separately and disposed off at the landfill site is used as cover material.

Sanjauli, Bus stand, Lower Bazaar and Lalpani are provided with dumpers that can easily be cleared every day. There are some areas, which generate less garbage, such areas are provided with iron or concrete dustbins and manual labour is used to empty them.



### **7.5.6 Inferences**

Shimla City has been experiencing severe environmental degradation over the past few years, damaging the ecology of the area and threatening human health. The Municipal Corporation is trying to motivate and educate people regarding problem of solid waste in the City. It has been observed that Dustbins/containers are not placed at appropriate locations and there is no scientific practice of garbage disposal and no appropriate site for land fill. Municipal Corporation Shimla has installed a Garbage Treatment Plant at Darani Ka bagicha, with treatment capacity of 90 T/day. It is estimated that garbage generation by the year 2021 is likely to be about 137 tons per day. So there is a need to establish one more treatment plant of treatment capacity of 50T/day.

So present setup of the solid waste management is ineffective and therefore it is imperative to bring whole city under solid waste management practices by the year 2021. It has become necessary to develop suitable sites for Garbage Disposal and Treatment at strategic locations in view of topographical and future development imperatives of Shimla.



# **CHAPTER - 8**

## **STRATEGIES AND RECOMMENDATIONS**

**8.1 Strategy for Physical Infrastructure**

**8.2 Strategy for improvement in Environment and Ecology**

**8.3 Strategy for Tourism development**

**8.4 General recommendations**

## CHAPTER – 8

### STRATEGIES & RECOMMENDATIONS

Shimla being the hub of many state, interstate and national level activities is likely to attract more population. The existing natural growth coupled with floating population is exerting heavy pressure on the existing resources. Unplanned and unauthorised constructions are taking place every where in the city. In order to combat the further deterioration and ensure the sustainability of the city, it is imperative long term strategies be formulated for the sustainable growth of the city. Here strategies have been suggested for the studied parameters of the sustainability as following -

#### **STRATEGIES**

##### **8.1 Strategy for development and maintenance of Physical Infrastructure**

Physical infrastructure is the bedrock of any city over which smooth functioning of the city depends to a large extent and sustainability of the city can not be guaranteed if physical infrastructure is not adequately planned and maintained. Present state of physical infrastructure in Shimla city is very dismal and needs a massive intervention. Physical infrastructure needs comprehensive measures so as to meet the future requirements of the population. On the basis of the study conducted measures are being suggested as following -

#### **WATER SUPPLY**

- 1) Up gradation of main water distribution network of shimla planning area**

Up gradation of entire water production, transmission and distribution should be done with an objective of reducing losses, improving water quality and proper distribution.

## **2) Augmentation of water supply distribution system for SADA areas**

Augmentation of water supply and distribution system is required for provision of proper water supply to newly merged areas of Dhalli, New shimla and Tutu and special areas of Ghanahatti, Kufri, and Shoghi. This will include provision of water storage system and laying of new distribution pipelines. Especially, special areas Ghanahatti should be provided with the water supply and storage networks because future growth will be directed towards Ghanahatti and Shogi areas and it is imperative to provide these areas with basic infrastructure as soon as possible.

## **3) Augmentation of water sources**

There will total requirement of 78.77 MLD in 2021 for the population of 3.2 lakh persons. Hence there will be total deficit of 48.77 MLD in 2021. This deficit can be compensated by the two potential sources i.e. river Giri & Pabbar, which have combined intake capacity of 72 MLD. To meet the water demand of Shimla city, the following interventions are identified:

- a. Augmentation of water supply scheme for Shimla city from river  
Giri
- b. Sourcing of water from river Pabbar

## **4) Rainwater harvesting**

In order to tackle the water scarcity problem of shimla, the strategy should aim at conservation of water through rooftop rainwater harvesting and

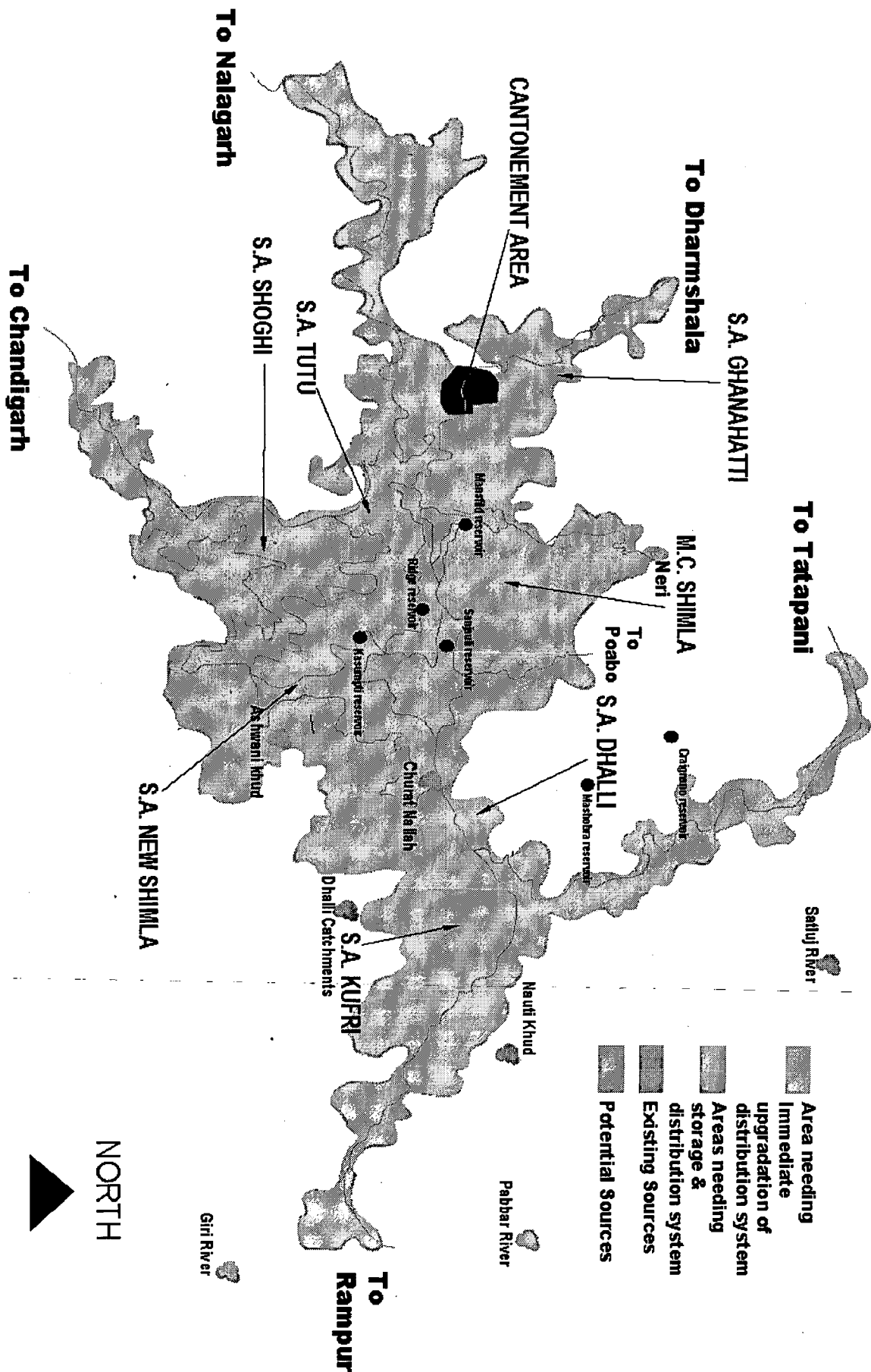
creation of water bodies/storage tanks at suitable locations along the hill slopes through construction of check dams. Roof top rainwater harvesting should be made mandatory in new buildings and hotel through local bylaws.

#### **5) Water monitoring cell**

Effective Management of the entire water supply system is necessary to judiciously use the limited water sources. Most of the water supply related problems of the Shimla city can be met at present if loss (which is 30% at present) is checked properly.

IPH and SMC should have a specialized wing for monitoring of water supply that carry out regular water loss monitoring through leak detections and surveillance. This will go a long way in prevention of loss of water which is at present more than 30%. Water monitoring cell should be provided with automation system including conducting GIS survey and mapping, digital control panels, electronic bulk meters, digital display system etc.

Map no. – 8.1 : Strategy Map of Water Supply



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## SEWERAGE SYSTEM

### 1) Extension

First of all sewerage network should be extended to all localities so as to utilize its present capacities. If possible new areas should also be linked.

### 2) Up gradation of Existing System

Up gradation of sewerage network including main line is required in order to increase dia of pipes, to prevent leakages and providing linkages to new network.

### 3) Provision of sewerage network for areas of Dhalli, Tutu, New Shimla and Special Areas of Ghanahatti, Kufri and Shoghi

Provision of new sewerage network for the areas of Dhalli, Tutu, New Shimla and Special Areas of Ghanahatti, Kufri and Shoghi should be done. This shall include construction of 7 STPs (Estimate by IL&FS) to serve the proposed sewerage network (Map – 8.2).

## SOLID WASTE MANAGEMENT

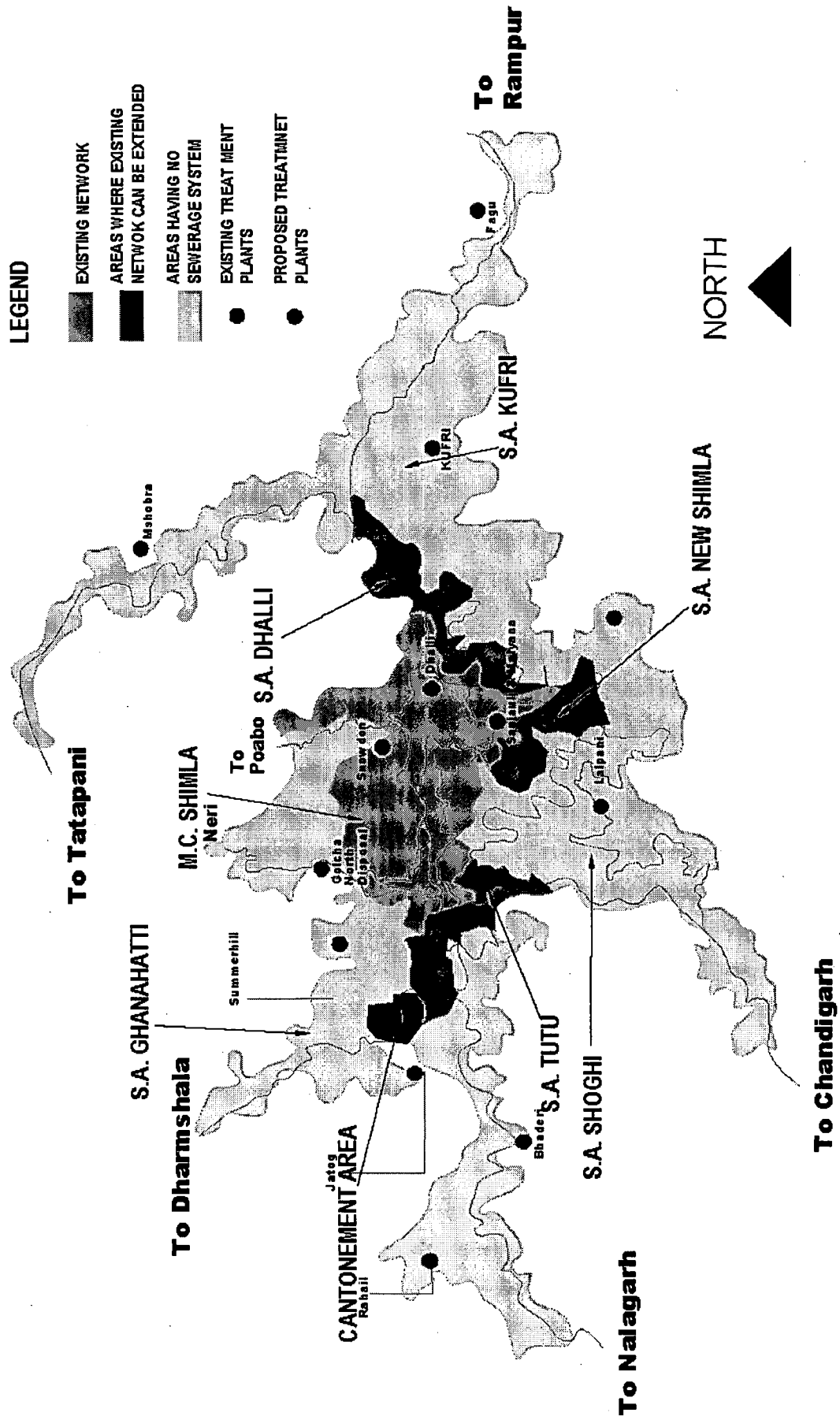
Strategy for Solid Waste Management should be as following:

- Door to door collection of solid waste should be extended to complete planning area in phased manner (Map -8.3).
- Prohibit littering on the streets by ensuring storage of waste at source in two bins; one for biodegradable waste and another for non biodegradable waste.
- Existing treatment plant should be shifted to outside city limits so as to avoid nuisance to residential areas. One more treatment plant with a treatment capacity of 50T/day should be installed to meet the requirements of 2021.
- Transportation of waste in covered vehicles on a day to day basis

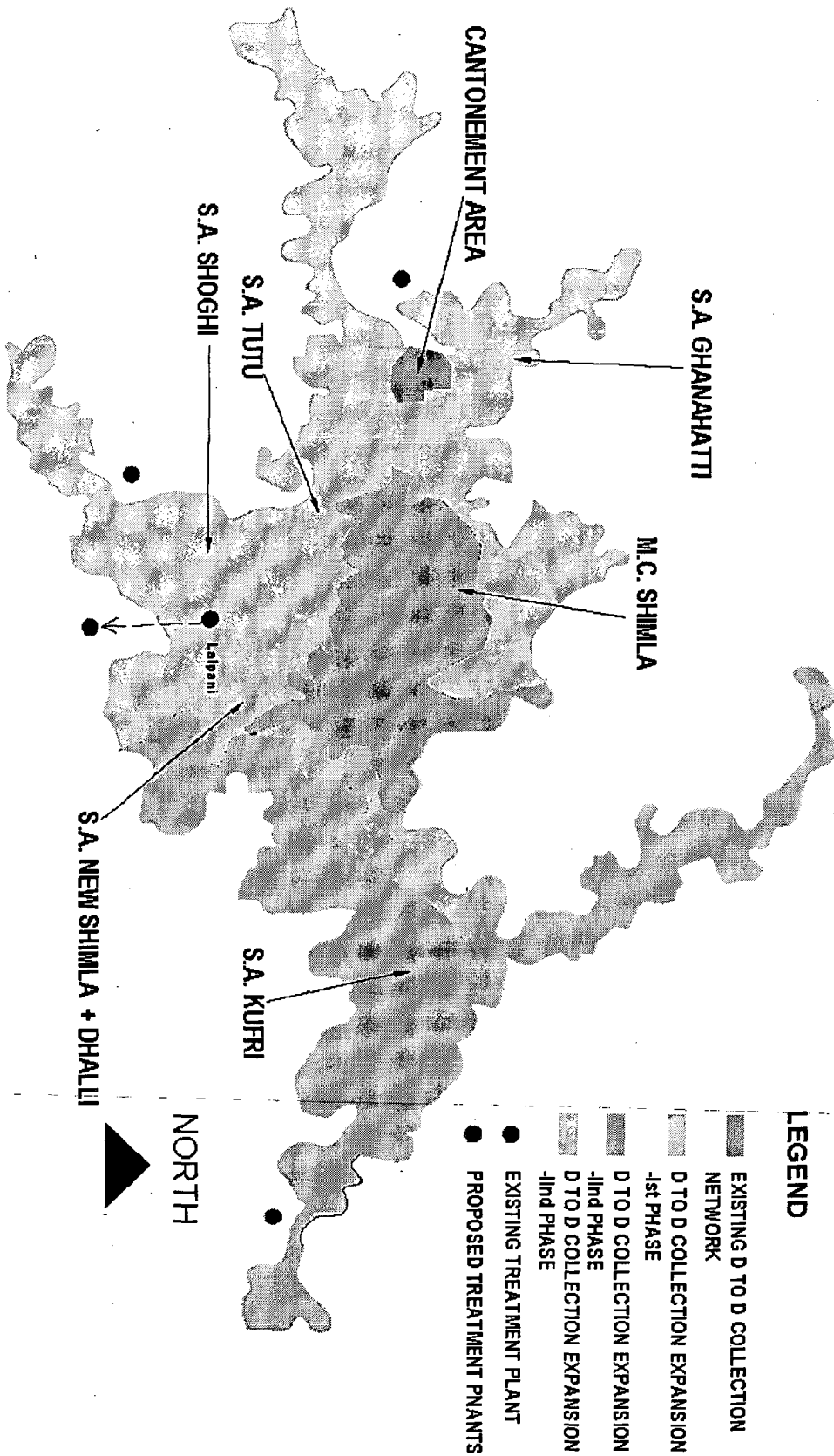


- Treatment of biodegradable waste using composting or waste to energy technologies.
- Storage of construction and demolition debris should be arranged within the premises of the property, where such activity is carried out. In case there is no space within the premises of the property, then the proprietor will arrange for immediate transfer of such waste to site earmarked by M. C. in Darni ka Bagicha.
- The open dumps and concrete/masonry bins must be abolished and replaced with mobile closed body containers.
- An integrated solid waste management plan should be prepared to effectively meet the requirements
- Community should be involved in the solid waste management practices in the city. To involve community adequate awareness campaigns should be launched.

Map no. – 8.2 : Strategy Map of Sewerage



Map no. – 8.3 : Strategy Map of Solid Waste



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## 8.2 Strategy for improvement in Environment and Ecology

The strategy for environmental management is based on integrating environmental and social by way of

- (1) Protection of water, soil and air quality from urban pollution
- (2) Minimizing urban impact on natural resources
- (3) Preventing and mitigating urban impacts on natural disaster occurrence.

The intervention identified for protection of environmental quality from urban pollution and minimizing impacts on natural resources are as follows:

- It would be desirable to prepare Comprehensive Environmental Management Plan for Shimla Planning Area and under this environmental impact assessment report should be made mandatory for every developmental work. This will help in identifying the impact arising out of the developmental projects.
- Construction in core areas (Sliding Zone) and Special area Kufri should be completely banned considering the ecological sensitivity of the areas.
- The Urban Forest within Shimla Municipal Corporation are facing constant threats from consumerism forces. The forests land encroached should be evacuated as per the High Court orders. Any further encroachments and unauthorized developments on forestland should be restricted and prevented.
- The public and private owners of green belts with large mass of green space must be involved in the planning process.

- All tourism activities should be promoted considering the ecological sensitivity of various areas. Tourism activities should be discouraged in ecologically sensitive areas.
- A comprehensive study should be conducted regarding site suitability for future development projects in Shimla and its immediate region. Areas safe from ecological point of view should only be allowed to develop.

### **8.3 Strategy for Tourism development**

In order to sustain economy tourism must be given due priority in Shimla. It is essential to focus at attracting high-end tourist and increasing duration of tourist stay. Apart from the designated tourism spots within Shimla, the potential tourism areas in the adjoining regions have great impacts on the tourism activities as well as the economy of Shimla. The foremost priority is the 'Preparation of a Comprehensive Tourism Perspective Plan' for the region to promote tourism industry. The comprehensive plan would address the regional tourism activities, nature-based tourism, culture-based tourism, local recreational amenities, tourism infrastructure, and transportation system.

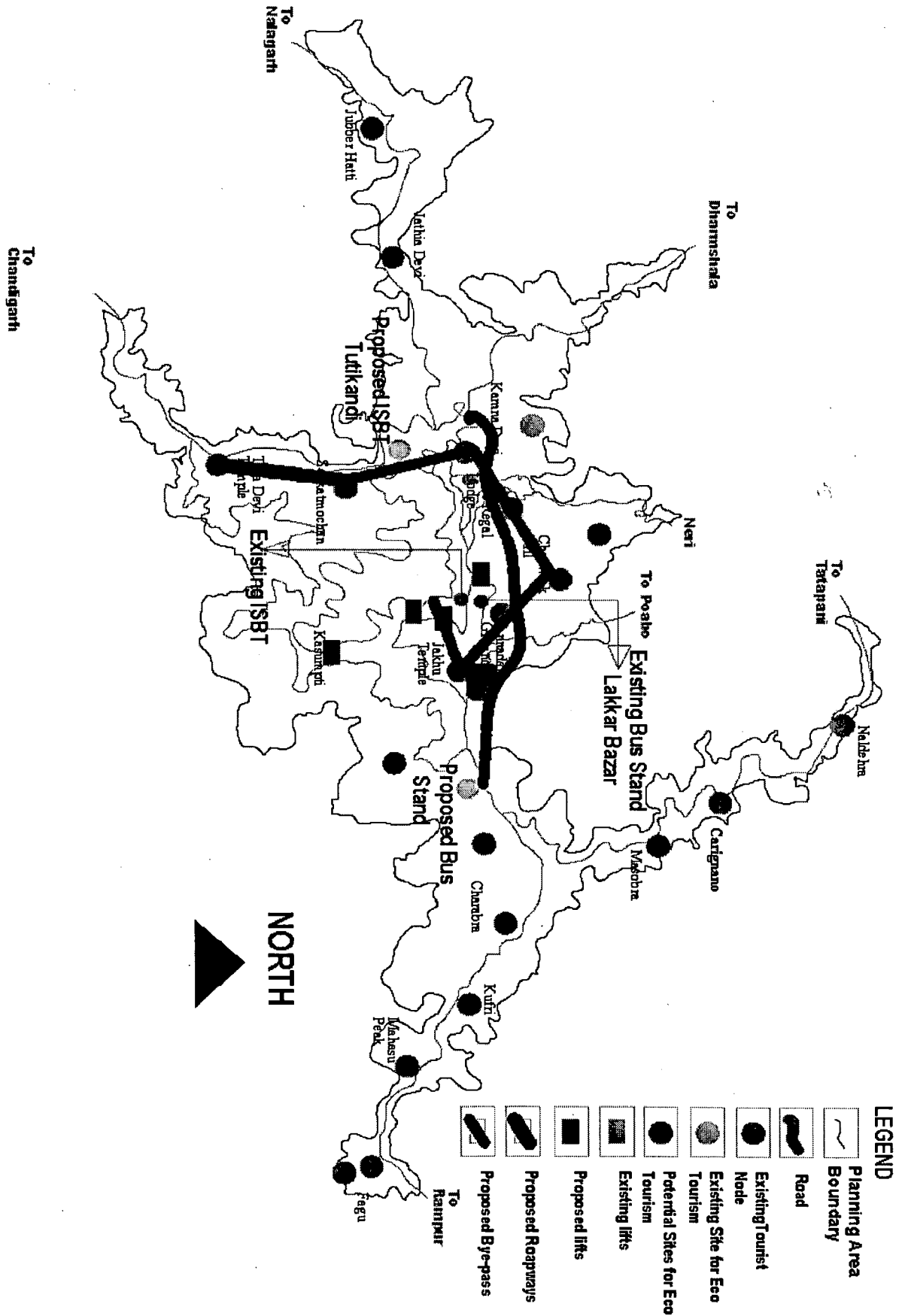
The strategy should aim at:

- (1) Improving basic infrastructure of the city like provision of adequate water supply, parking facility, transportation, etc which will improve service delivery and shall provide impetus to the tourism.
- (2) Improvement in transportation linkages especially with respect to air connectivity is essential to attract high-end tourism.

- 
- (3) A by-pass should be made on North of the city to avoid congestion in central city area which is main tourist attraction due to built heritage ( Map – 8.4).
- (3) In order to attract high-end tourism and also ensure protection of ecology, it is essential to promote ecotourism projects at potential locations (Map – 8.4) .
- (4) In order to enhance duration of stay and sustain tourism economy, there is need to add activity based tourism like international golf course, theme parks, nature park/botanical garden etc which can cater to different category of tourists like foreign tourists, senior citizens, children etc. Some of the interventions identified are as follows
- Upgradation of Naldhera Golf Course to international standards
  - Development of Nature Park at Craignano
  - Development of Theme Parks
  - Upgradation of existing parks
  - Upgradation of Ice Skating Rink
  - Redevelopment of horticulture museum at Navbahar
  - Beautification of mall through special mall conservation pla..
- (5) Village tourism should be encouraged to ensure dispersal of tourists across the region to open up new areas for tourism and to provide employment opportunities in the rural areas. Village tourism is also expected to provide a closer glimpse of the local art, culture and crafts for the visiting tourists. Liberal fiscal policies should be followed to attract private investments in the rural areas.

- (6) The tourism potential of forests and wild life sanctuaries in the area should be harnessed and camping sites with adequate infrastructure facilities for trekking trails, bird watching towers, rain-shelters, public conveniences and parking should be developed.
- (7) Promotion of local art and culture is a major component of tourism promotion. The private sector should be encouraged to patronize and promote local folk culture and crafts.
- (8) Bridle paths leading to some of the most beautiful sites in the area pass through some villages and hamlets. The concept of 'eco-treks' is should be promoted for the reason that bridle/inspection paths to some of the most picturesque areas are already existing and with little expenditure can be made eco-tourism worthy.

Map no. – 8.4 : Strategy Map of Tourism





**(9) Promotion of Eco-tourism at Shimla:**

Apart from the existing tourist based functions within Shimla the other eco-tourism sites namely near Sanjauli, Chcharabra and Fagu should be developed (Map – 8.4).

Apart from the regular facilities following things should be developed to promote Eco-tourism.

**Film Studio:** Development of a state of the art film studio containing the natural setting of hills and other natural beauty.

**Eco-lodges:** Eco-lodges, tree houses should be promoted designated Forests, Gardens.

**Eco-Convention Center:** Eco-Convention Center within the raw ambience of the forest and hills should be developed. Motorized accessibility should be restricted up to the edge of the forest. Thereafter improved mechanized traditional vehicles e.g. horse cart, bullock cart, animal rides would be used to ferry the tourists or visitors to the convention center. The architecture and ambience should be absolutely blended with the nature, where as the interior would contain the high quality infrastructure facilities such as sanitation, water supply, air-conditioning etc.

**Forest Based Recreation:** Forest based recreations such as trailing, picnic, campgrounds should be developed in proposed sites. Hunting, though a popular sport-form, should be discouraged through regulations in the forest areas, with strict adherence to animal and wildlife protection policies of the country. Existing horticulture gardens are to be opened to public with necessary restrictions for picnic and camping activities.

**Heritage Restaurant cum Hotel:** It is proposed to develop heritage restaurant cum hotel built with the ambience of local culture and tradition in one of the proposed sites. Private entrepreneurs should be invited to build and operated such functions.

**Parks:** Theme Park, Aquatic Park, and Heritage /Cultural Park should be located in the vicinity of eco-tourism sites.

**Artisans Village cum Vocational Training Center:** To promote local handicrafts and allied functions where talented artisans from all over the region would be invited to reside, an artisans village should be developed. The local handicrafts include Carpet, Woolen garments, Jackets, Handloom products, Cane and Bamboo craft, Ornaments, Embroidery work, etc. These artisans would perform their activities independently as well as provide vocational training to the young generations to maintain the continuity of such traditional arts and culture that are on the verge of extinction. The produces of the artisans should be marketed by the public agencies through appropriate mechanism.

**High Altitude Zoological Garden:** It may be initiated with a raw natural setting.

**A botanical garden and orchid sanctuary** and other flora & fauna need to be developed in the eco-tourist sites.

**Food Festival:** A Food festival of one-week to fortnight duration, depending upon the demand, is proposed which would attract the tourists, merchants from all over the country, foreign tourists as well as local residents. This festival would have commercial values for the traders and producers, and educational value to the young entrepreneurs, students and local residents. As part of this festival organised tours may be arranged through various gardens, which would fetch revenues from the tourists and visitors.

**Heritage Tourism:** The Shimla-Kalka toy train has already been declared as Heritage Train. The attempt should be made jointly by the tourism department and the railways to attract more number of tourists to utilise this oldest wonder of the miniature railways.

**Traditional Cultural Festival:** These should be organised jointly by the public and private agencies for a duration in the peak tourist season, advertised nationally and internationally with appropriate publicity which would attract the tourists travelling to other nearby destinations.

#### **8.4 Strategy related to growth direction of the city**

Considering the present scenario of Shimla city, to check population growth seems impossible in immediate future, considering the various advantages extended by the city. Hence there is an urgent need to identify the future growth direction of the city for the sustainability of the city.

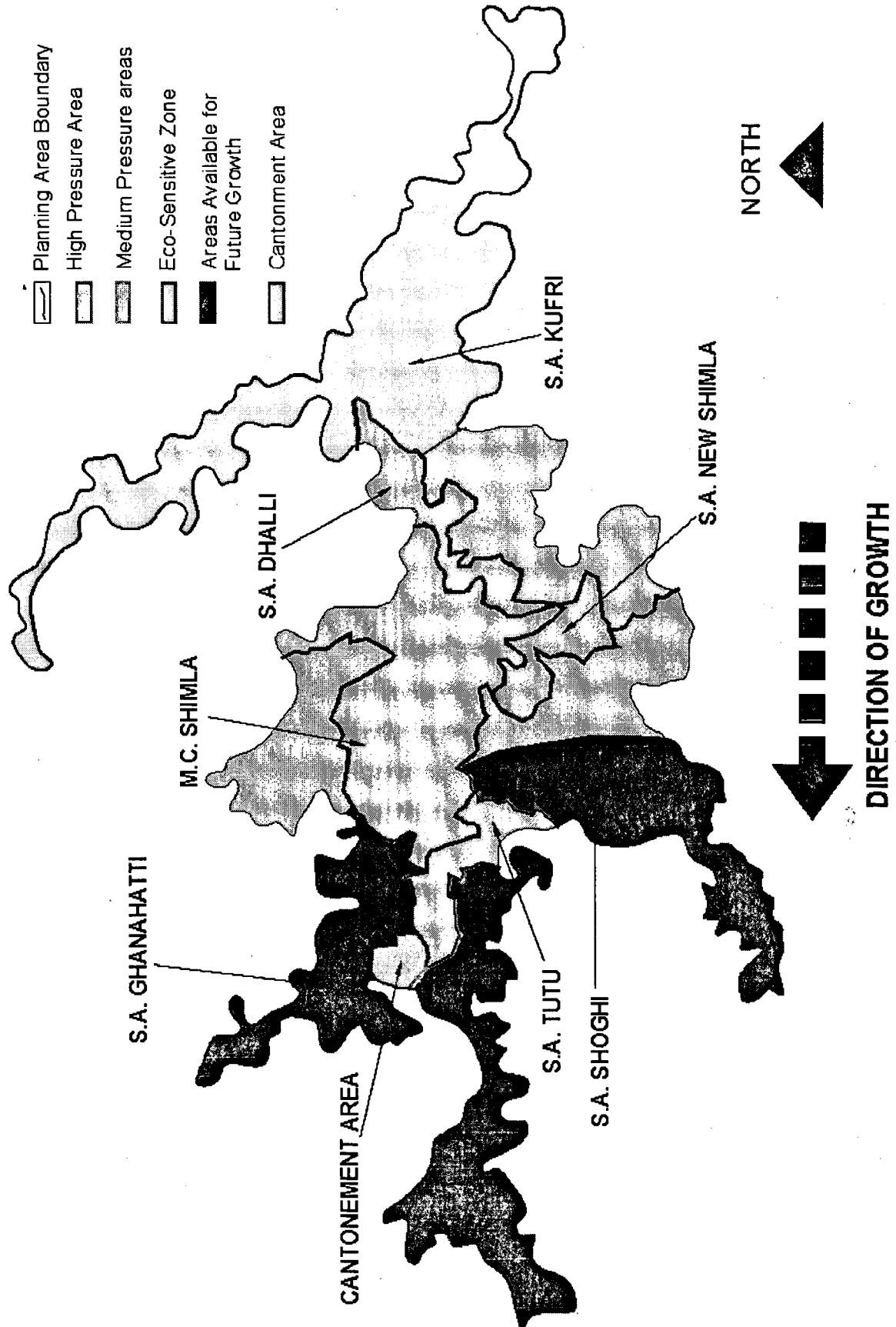
Non-availability of the adequate land in North and South and presence of ecologically sensitive areas in the East, West is the only direction where city can grow in future. Hence development activities should be promoted in special areas of Ghanahati, and Shoghi as shown in Map no. – 8.5. These areas are the least developed areas in Shimla Planning areas and have lowest gross densities.

Hence these areas of the Shimla Planning area provide adequate space for various activities.

#### **Rejuvenation of old parts of the city**

Balanced growth of the city can only be ensured if older parts of the city especially core area is also given due attention. Core areas needs a massive effort in terms of re-allocation of the non – confirming uses (Truck stands, wholesale, grain, timber) and up gradation of the infrastructure

Map no. – 8.5 : Direction of Future growth of the city



#### 8.4 GENERAL RECOMMENDATIONS

There are many points which were highlighted during the course of the study. It would be highly beneficial for city as a whole if some corrective measures are taken related to negative points. Following are the some recommendations based on the study which will further enhance the goal of sustainable development of Shimla city –

- There is acute pressure on the resources of the city especially water and land. Considering this pressure, it is advisable to fix city's max. allowable population as 3.2 lakh for 2021 and simultaneously start thinking in terms of reallocating capital functions from the city to some other part of the state so as to save the city from further deterioration and to regain the lost grandeur of the "Queen of Hills".
- Incompatible activities existing in the city namely, Truck stands (roadside), wholesale, grain, timber, vegetable markets and workshops should be established just outside the city limits.
- Besides planning and development of Activities Zone, there is an urgent need to establish three satellite towns in the vicinity of the city to check migration to the city. Further a comprehensive Shimla Capital City Regional Plans should be prepared to develop the growth centers in its region and thereby diverting the trend of migration towards them
- It is suggested that this city should be developed primarily as tourist city for which it is known to the world and other functions should be compromised considering the long term benefits of inhabitant and of the state as a whole.

**CHAPTER - 9**  
**CONCLUSION**

## CHAPTER -9

### CONCLUSION

Sustainable Development is a very wide concept and its meaning varies with area of application. At settlement level, there are no. of parameters which are necessary to take into account to achieve fully sustainable settlement. Out of all those parameters, most influencing parameters i.e. Economy, Ecology and Physical Infrastructure were taken for the study of Shimla city. A detailed analytical study was conducted on the lines of these three parameters.

Study brought out some strong points like physical infrastructure of the city is in critical situation and needs immediate attention. Ecological degradation of the city by consumerism forces have resulted in inhibiting the growth of tourism industry and deterioration of overall health of the city.

Most critical element i.e. water supply of the city was selected for carrying capacity analysis and maximum carrying capacity of the city based on water supply was fixed at 3.2 lakh people.

After detailed study strategies and recommendations have been proposed for the sustainable development of the city. It is believed that if strategies and recommendations are followed properly city will be able to achieve the desired goal of sustainable development.

## BIBLIOGRAPHY

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### BOOKS:

1. Mukherjee, B. M. 'Technology for Sustainable Development', Guru Ghasidas University Publication, Bilaspur, M. P. 1990.
2. Tiezzi, E., Brebbia C. A. & Uso J. L., 'Ecosystems & Sustainable Development', WIT press, New York, 2003.
3. Daniel M. Dworkin, 'Environment & Development', SCOPE Publication, Indianapolis, USA, 1974.
4. Kanwar Pamela, 'Imperial Shimla, The Political Culture of the Raj', Oxford University Press, New Delhi, 2005.
5. Balokhra, Jag Mohan, 'The Wonderland Himachal Pradesh', H. G.Publications, New Delhi, 2006.
6. Jodha, N. S. 'Sustainable Development in Fragile Environments', Centre for Environment Education, Ahmedabad, 1995.
7. Civil Engineering for Sustainable Development, (Proceedings of the international conference), University of Roorkee, 1997.
8. Singh, Tejvir, 'Studies in Himalayan Ecology and Development Strategies', The English Book Store, New Delhi, 1980.

### REPORTS:

1. Interim Development Plan, Shimla – 2001
2. Draft Interim Development Plan, Shimla – 2021
3. City Development Plan, Shimla - 2006
4. Mussoorie Master Plan – 2001



5. Brundtland Report, WECD,1987.

#### **DISSERTATIONS:**

1. Sahota, Jeevan Singh, 'Planning for sustainable development of hilly areas, Case Study: District Uttarkashi', Department of Architecture & Planning, I.I.T. Roorkee, 1996.
2. Gautam, Samita, 'Planning for sustainable development of Baroda City', Department of Architecture & Planning, I.I.T. Roorkee, 2001.
3. Murthy, K. Sreerama, 'Planning for sustainable development for Gara Mandal, Andhra Pradesh', Department of Architecture & Planning, I.I.T. Roorkee,2001.
4. Lokesh, G. 'Planning for sustainable development of Pondicherry city', Department of Architecture & Planning, I.I.T. Roorkee, 2002.
5. Kumar, Nand, 'Planning for sustainable development of walled city of Jaipur', department of Architecture & Planning, I.I.T. Roorkee, 2006.

#### **DOCTORAL THESIS**

1. Negi, Manika, 'Planning for sustainable development in Garwal Hill Region' Department of Architecture & Planning, I.I.T. Roorkee, 2001.

#### **RESEARCH PAPERS:**

1. Kyaw Sunn Wynn & Shovan K. Saha, 'A Three Pronged Approach to Improving Urban Living Environment', in SDR, May-June 2003.
2. Gupta, R. C. 'Conceptualising Sustainability in City Development: Emerging Urban Challenges', in SDR, Nov.-Dec, 1999.
3. Bill Hopwood, Mary Mellor and Geoff O. Brien, 'Sustainable Development - Mapping Different Approaches' in Sustainable Development, vol-13, December, 2005.

4. Kostas P. Bithas and M. Christofakis, 'Environmentally Sustainable Cities- Critical Review and Operational Conditions' in Sustainable Development, Vol-14, January 2006.
5. Fernandes B. G. ' India's Cities in Crisis' in Spato-Economic Development Record, Vol – 6, No. – 6, November – December 1999.
6. Hatwal Mukul K. 'Sustainable Urban Development Through Appropriate Spatial Planning : A Case Study of Haridwar' in Spato-Economic Development Record, Vol – 7, No. – 1, January – February 2000.

#### **NEWSPAPERS :**

1. The Hindu, Thursday, September 7, 2006
2. Dainik Bhaskar, Wednesday, April 19, 2006
3. Amar Ujala, Saturday, March 24, 2006
4. Dainik Bhaskar, Sunday, March 19, 2006
5. Divya Himachal, Friday, March 23, 2006
6. Amar Ujala, Tuesday, May 2, 2006, March 19, 2006
7. Dainik Bhaskar, Sunday, February 12 , 2006

#### **WEB SITES:**

1. [www. Himachal.nic.in](http://www.Himachal.nic.in)
2. <http://www.chesapeakecommunities.org>
3. [www.panda.org/ict](http://www.panda.org/ict)
4. [info@3mfuture.com](mailto:info@3mfuture.com)
5. [www.oecd.org](http://www.oecd.org)
6. [http://en.wikipedia.org/wiki/Sustainable\\_development"](http://en.wikipedia.org/wiki/Sustainable_development)
7. <http://www.gdrc.org>
8. [www.sustainable –development.gov.uk](http://www.sustainable-development.gov.uk)

## ANNEXTURE - I

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### Population Projections

The population serves as the main parameter in all the development endeavours. The process of planning is always directed towards providing maximum good to the population. Planning exercise therefore, becomes predominantly futuristic. Estimates of the future population are therefore, required by planners to analyse the future demands of the infrastructure and pressure of these demands on the available resources. Population forecasts can orient the targets to be included in economic and social programmes of the governments and sometimes can indicate priority among these programmes. There are various methods used for the population projections. Here projections have been made using Geometrical Progression Method, considering the fact that this method best suites the past trend of the population growth.

Total population in the year 1991 = 129827

Total population in the year 2001 = 1,74789

According to Geometric Increment Method:

$$P_n = P_o (1+r)^n$$

Where  $P_n$  = forecasted population of n years

$P_o$  = Population at present

n = Number of years

r = rate of growth

To find r,

$$P_{2001} = P_{1991} (1+r)^{10}$$

$$1,74789 = 129827 (1+r)^{10}$$

$$1+r = 1.03$$

$$r = 0.03$$

Therefore population in the year 2021

$$\begin{aligned} P_{2021} &= P_{2001} (1+0.03)^{20} \\ &= 1,74789 (1.03)^{20} \\ &= 315688 \end{aligned}$$

$$\begin{aligned} \text{Increase in population} &= P_{2021} - P_{2001} \\ &= 315688 - 174789 \\ &= 140899 \end{aligned}$$

As far as floating population is concerned it is anticipated to be 76000 and 100000 for the year 2011 and 2021.