CHAPTER 1

INTRODUCTION

The Great Himalayas of India are the great source of inspiration. People around Himalayas are blessed in many ways, as the entire range is enriched with natural vegetation, providing us the greatest treasures of nature since ancient times. The traditional herbal medicines and association between plants and man predates history. Medicinal plants are the local heritage with global importance. ‘Health is dearer than wealth’ as quoted by Hamilton (1997) so, the value of medicinal plants is much more what it is in the market place. Human beings have been utilizing plants for basic preventive and curative health care since time immemorial (Holley and Cherla, 1998). World is endowed with a rich wealth of medicinal plants. As many as 35,000 – 70,000 species of plants have been used at one time or another for medicinal purposes (Fransworth and Soejarto, 1991). From historical records, the human use of plants or their floral parts to enhance physical and spiritual well-being goes back thousand of years and it is very difficult to date precisely (WWF, 2000). However from these records, it is apparent that most of the early people, such as the Assyrian, Babylonians, Egyptians and ancient Hebrews, were familiar with the properties and use of many medicinal plants (Ghani, 2003). The practice of medicine using the medicinal plants flourished the most during the Greek civilization, when historical personalities like Hippocrates (born 460 BC) and Theophrastus (born 370 BC) practiced herbal medicine. The material medica by Hippocrates listed around 400 medicinal plants and later the encyclopedic work of Discordies, ‘De material medica’ (published in 78 AD), which featured about 600 medicinal plants, have been regarded as the fore runners of all the modern pharmacopeias and authoritative texts on botanical medicine. In the middle Ages, the Greek Pharmacist Physician, Galen (131-200 AD), wrote about 500 volumes describing hundreds of recipes and formulations containing a large number of medicinal plants. He was the first person to describe the procedures and methods of preparing therapeutic recipes, including the ingredients of both plant and animal origins (Claus and Tayler, 1965). This doctrine, expatiated by Galen, has been the basis of allopathic and homeopathic systems of medicine practiced today.
The earliest known Chinese pharmacopoeia, the *Pen Tsao*, attributed to the legendary emperor Shen Nung, appeared around 1122 BC; this authoritative work discovered the medicinal use of many plants. The use of medicinal plants in Europe in the 13th and 14th centuries was based on the *Doctrine of Signatures or Similar* developed by Paracelsus (1490-1541 AD), a Swiss alchemist and physician. According to this doctrine, all plants possessed some sign, given by the Creator, which indicated the illness, symptom or diseased organ for which they were intended. A common example of this doctrine includes Ginseng – *Panax ginseng* (Murray, 1994). The Arabian Muslim physicians, like Al-Razi and Ibn Sina (9th to 12th century AD), brought about a revolution in the history of medicine by bringing new drugs of plant and mineral origin into general use. Enriching the original Greek system, *Al-Kanun* of Ibn Sinalaid down the foundation of modern western medicine (Mian and Ghani, 1990). The medicinal plants used by the Australian aborigines many centuries ago also added to the global stock of medicinal plants. The South American countries have provided the world with many useful medicinal plants, grown naturally in their forests and planted in the medicinal plant gardens. The African people have been depending on plant-based medicines more than any other continent’s people. As far as the south Asian data concern, the earliest mention of the medicinal use of plants in the Indian subcontinent is found in the *Rig Veda* (4500-1600 BC), the oldest book in the library of mankind. This book provides much information on the medicinal use of plants in the Indian subcontinent.

For time immemorial plants have been playing an important role in the health care of a majority of people all over the world. In India, approximately two million traditional health practitioners use medicinal plants for curing various ailments (Venkatesh, 2002), of these a sizeable number of herbal practitioners regard the Himalaya as a storehouse of varieties of herbal medicines. Located in the Himalaya, the vegetation wealth of Uttarakhand has received a significant attention throughout the ages in curing various chronic human ailments (Gaur, 1999). Unfortunately, the centuries old traditional knowledge on therapy developed over the years of experiments and experiences has declined sharply since the spread of allopathic drugs (Kala, 1998). This decline has resulted in the loss of knowledge on the use of many important plant species and techniques of making various indigenous medicinal formulations (kala et al., 2004).
Moreover, with the growing problems of bio-piracy there is a need to document the various uses of these valuable bio-resources with a view to reduce the possibility of bio-piracy and protect the rights of traditional herbal healers. The patent drama on turmeric highlights that the centuries old traditional knowledge on medicinal plants can not be protected fully within the patent system as it stands today (Udgaonkar, 2002). Thus, there is an urgent need to document the therapeutic uses of various ingredients used by the traditional healers to avoid the misuse of their intellectual property. Plants being the major ingredients in traditional medical system need a special care for their long term sustainable utilization so that the raw material can be made available for preparing medicine to the herbal healers as well as to the herbal industries. To the early civilization herbs and medicinal plants have been objects of special wonder. Sages sanctified and worshipped these trees as abodes of deities in India the knowledge of medicinal herbs and plants has been continuously passed on through generation right from the Vedic era. The earliest and the main source of Ayurveda is Atharvaveda. In the ancient days the sages used to live in gurukuls (traditional Vedic schools of that era) established in secluded areas in the forests. Their collaborators were inhabitants of nearby villages tending herbs in the forests, who also collected fresh herbs for the preparation of the herbal medicines for the disease curing. The results were miraculous because the herbs collected were pure fresh and were collected only after confirming their identification in consultation with the sages. Healers have realized on the nature for the well being of mankind as they believe that God has infused with lots of potential for curing diseases.

Status of herbs and medicinal plants of medical value in India since ancient time till recent, the human association with plants and vegetation is as old as the advent of man on earth. Indeed the text prescribe that the vegetation growth preceded the humans on earth. It seems quite logical because no human can survive on earth without vegetation, which happens to be the primary source for the supply of oxygen, so essential for human survival.

Since the ancient communities were dwelling mostly in the forests, they gradually became conversant with the medicinal properties of the herbs/plants and started using them for the cure of various types of ailments. The continued stay of human beings in the environments of nature made him observe the various qualities in the plant
kingdom, which he made use in variously in his daily life. Though with the advancement of civilization man left his rural abodes, patronizing urban habitats, but still the ascetics, sages and rishis never left their forest abodes as they served as great centers of learning, knowledge and educational institutions, by their constant efforts and research, particularly on medicinal properties of plants, served humanity at large to remove their disorders. Ancient Indians also developed the knowledge of the plant kingdom, which is evidenced from the use of the epithet Vrksayurveda which means the science of the treatment of plant diseases and Sitadhyaksa (Superintendent of agriculture) by Kautilya in the Arthasastra.

Ayurveda “the complete knowledge for long life” or ayurvedic medicine is a system of traditional medicine native to India and a form of alternative medicine. In Sanskrit, ayus, meaning “longevity”, and Veda, meaning “related to knowledge” or “science”. The earliest literature on Indian medical practice appeared during the Vedic period in India. i.e.; in the mid-second millennium BCE. The Susruta Samhita and the Charaka Samhita are great encyclopedias of medicine compiled from various sources from the mid-first millennium BCE to about 500 CE. They are among the foundational works of Ayurveda. Over the following centuries, ayurvedic practitioners developed a number of medicinal preparations and surgical procedures for the treatment of various ailments.

The study of the science of botany by the ancients was quite deep rooted, and as a result of which they could even provide the classification of plant life. These classifications were based on the botanical names of the plants; their properties (botanical) and those having food value.

The earliest classification is available in the Rigveda, wherein they have been defined as:

(i) Phalini - those bearing fruits.
(ii) Aphala - those trees or plants which do not bear fruits.
(iii) Apuspa - those which do not blossom.
(iv) Puspint - those which bear flowers.
Tradition of medicinal plants use in India is about 4000 years old. In the Ayurveda, about 1400 plants are documented in various texts. In Charaka Samhita, Sushruta and Ashtang Hridaya we can find more than 600 plants. Rig Veda (4500 to about 1600 B.C.) is perhaps the oldest document where medicinal plants have been described. Atharva Veda also describes medicinal uses of large number of herbs/plants. Another treatise Dravya Guna Shastra provides information about medicinal plants from pharmacological point of view. Similarly, Unani and other systems of medicine practiced in India are largely dependent on medicinal plants. The wider acceptance of herbal based formulations is the growing recognition that natural products are non-narcotic and almost without side effects.

People in the mountainous areas are dependent highly on the plant resources for food and medicine due to several reasons including isolation, and relatively poor access to suitable agriculture land. Over centuries of trial and errors they have developed knowledge about the utilization of diverse forest resources. The age-old traditional values attached with various forest types, meadows and with the varieties of forest products including the medicinal plants have gained a wide acceptance across the world at present.

In our country the knowledge of medicinal herbs/plants has continuously passed on through generation’s right from the Vedic period. The earliest and the main source of Ayurveda is Atharvaveda. As in the ancient days the sages used to live in gurukuls (traditional schools of that era) established in secluded areas in forests. They routinely investigated and used medicinal plants. As mentioned their collaborators were inhabitants of nearby villages tending herbs in the forests, which also collected fresh herbs. The medicines prepared from these herbs were used for treating people. The results were miraculous because the herbs were pure and fresh collected only after confirming their identity in consultation with the sages. The people were so impressed so much that in course of time Ayurveda developed and grew into the first medical system due to the untiring efforts of great minds like Dhanavantari, Charak, and Sushrut, the ancient practitioner of surgery, that the system had even developed artificial limbs.

Many people think of herbs as medicine used only by alternative practitioners who do not use conventional medical practices. But in fact, herbal medicine is a
precursor of modern pharmacology. About one-quarter of all prescription medicine come from herbs and other medicinal plants, and many doctors and researchers are taking a new look at traditional herbal remedies.

Unfortunately, there are some misconceptions about the benefits and the safety of herbal medicines. Many people assume that just because herbal remedies are made from natural ingredients they are safer than synthetic drugs. In reality, some herbal medicines—just like their pharmaceutical counterparts can have adverse effects. Some are even highly toxic. In addition, it should be remembered that herbal remedies are not subject to the same rigorous testing and standards that are required for pharmaceutical products.

Every society has relied on the healing power of herbs to treat illness, and in some cultures, herbal medicine still prevails. Traditional Chinese healers and Ayurvedic practitioners, for example, continue to use ancient herbal remedies, although these may be combined with modern medical treatments. In Western societies most medicines are synthesized, including many that were originally made from herbs. But these are exceptions: digitalis, the oldest effective heart medication, is still made from foxglove; morphine and codeine are derived from opium poppies; and vincristine, used to treat leukemia, comes from the Madagascar periwinkle.

Interest in medicinal herbs/plants has grown dramatically in recent years. Consumers now have a wide variety of herbal supplements to choose from, including heart disease, cancer, arthritis, low immunity, depression, common colds and menopausal concerns. Medicinal herbs/plants are distributed across diverse habitat types, landscapes and altitudinal ranges. Information is urgently required on the source and availability of raw material for herbal industry, especially on the aspects of present production, if cultivated, or range and pattern of natural distribution and areas with rich population if originating from the wild.

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![Graph of plants used by various systems of medicines](image)

**Figure 1:** Plants being used by various systems of medicines
There are more than 8,000 plant species in South Asia with known medicinal uses (Switzer and Karki, 2003). Thus historically it is evident that South Asia is home to many rich Traditional Systems of Medicine (TSM). The Ayurvedic system (dates back to 5000 BC) along with the Unani, Siddha and Tibetan systems remain important sources of everyday health and livelihood for tens of millions of people (Switzer et al., 2003). Medicinal plants, including trees, shrubs, grasses and vines, are central resources for the raw materials used in these traditional health systems. Modern allopathic medicine is also using extracts and agents from many medicinal plants.

Indian Medicinal Plants and Herbs in International Context

Herbal Medicinal Market

The herbal medicinal markets especially international markets for the medicinal herbs/plants have always been very large. The industry is complex with little vertical integration. Indian market is rising sharply and expected to hit Rs 14,500 crore marks with exports reaching Rs 9,000 by year 2012. The herbal market has an annual compounded growth rate of 20-25% respectively. India is followed by China as large producer of medicinal plants have more than 40% global diversity.

Laird (1999) finds it difficult to analyze data relating to the medicinal plant markets as a large number of small and medium-sized companies in the industry are hesitant to share data. Wholesalers are also hesitant to provide information for fear that companies might try and bypass them. Moreover, cross-trading between companies is commonly practiced, adding to the difficulties of understanding the trade (Dennis, 1998). In most cases, manufacturers do not know the original sources of their medicinal plants. Most manufacturers in Europe and North America buy from large wholesalers, some of the biggest of which are in Germany.

The largest global markets for medicinal plants/herbs are China, France, Germany, Italy, Japan, Spain, the UK and the US, while Japan has the highest per capita consumption of botanical medicines in the world (Laird, 1999). In the US and Europe, the trade has typically been growing at an average of 10 % per annum, partly because of
the popularity of alternative treatments and partly because there is increasing official recognition of the benefits of traditional medical systems involving herbal preparations. Conservative estimates put the monetary value of the medicinal and aromatic plant (MAPs) related global trade at over 60 billion USD as of 2000 (Govt. of India, 2000). With the increasing popular demand for medicinal plants, both in South Asia and internationally, this trade is expected to grow to 5 trillion by the year 2050 (FRLHT, 1996). As per WHO 80% of the population of the developing countries rely on the traditional medicines, mostly plant drugs, for their primary health care needs. Also, modern pharmacopoeia still contains at least 25% drugs derived from plants and many others which are synthetic analogues built on prototype compounds isolated from plants. Demand for medicinal plants is increasing in both developing and developed countries. As per a study in 1998 by Business Communication Company Inc (BCC), Norwalk; for plant derived drugs was valued at $22.608 million in 1997 and reached around $30,688 million in 2002, representing an average annual growth rate (AAGR) of 6.3%. The market in China is large and shared between public and private ownership. Thirteen of the top companies producing Traditional Chinese Medicines (TCMs) are listed publicly on the domestic stock exchange. Fourteen are state-owned. China’s total out put of medicinal plants from cultivated and wild-harvested sources is 1.6 million tons (Kuipers, 1997). Overall sales of botanical medicine products in China in 1995 were estimated at US$5 billion (Laird, 1999). The botanical medicine market in Japan in 1996 was estimated at US $2.4 billion with a rapid sales growth in recent years as Japanese doctors increasingly incorporate TCM as a complement to western medicine. In 1983, 28% of doctors used TCM, but by 1989 this figure had risen to 69 per cent (Laird, 1999). Besides China, India is a major exporter of raw medicinal plants and processed plant-based drugs. Exports of plant-based crude drugs from India in 1995 were valued at US$53.2 million (Lambert et al., 1997). Europe is a major world trader in medicinal plants. At least 2,000 medicinal plants species are traded, of which two thirds (1,200-1,300 species) are native to the continent (Lange, 1998). About a quarter of global imports of medicinal plants each year are into Europe. In 1992-96, imports to Europe came from more than 120 countries, with 60 percent of the material coming from outside Europe, mainly from Africa and Asia. Between 1985 and 1995, the average annual growth rate in the European market was 10 per cent, with 4.4 million tonnes imported in 1996 valued at US$1.3 billion. Germany is the leading European importer while France, Italy, Spain and the UK are among the other 12 importing countries that depend on bulk
quantity of plants from Asia and Africa (Lange, 1998). Meanwhile, 13 Germany has a large re-export trade. Between 1992 and 1996, Europe exported an average of 70,000 tones of medicinal plants annually, 20% to non-European destinations, mainly North America. The trade structure in Europe is complex and dominated by a few wholesalers, however, the structure of the trade varies from country to country, as does the definition of products (Lange, 1998). In looking at the common marketing and distribution channels, in producer countries generally the plant material is bought from collectors and cultivators by various types of traders, including local dealers, village cooperatives and district traders. It is then passed on to wholesalers, manufacturers or directly to retailers. The wide range of manufacturers involved can include those engaged in the production of pharmaceuticals, extracts, cosmetics, foods and coloring agents. The number of outlets for medicinal plants reflects their diversity of uses (Lange, 1998). The material of a species which has entered the wholesale or manufacturing sectors may have originated from various harvesting areas within countries, or it could even have been imported. This makes it very difficult to identify the sources of materials and impose quality controls. The lengths of trade chains and the perceived need to protect information lead to a lack of transparency. A direct consequence is that those located at the start of the chains (producers and collectors) possess little idea of the market value of the medicinal plants which they are supplying, nor have the means to discover the value added from source to end-use. In India and Nepal, some NGOs are working to make market information available to collectors in order to give them (those collectors) more bargaining power. The lack of transparency means that it is difficult to influence the trade easily in order to improve the sustainability of the sources of medicinal plants (WWF, 2000).

Movements of plant materials traded internationally (Source: WWF, 2000). Though it is evident from the above findings of Fransworth et al. (1997), Lange (1998), Laird (1999), that the market is growing and demand is increasing for medicinal plants, there is a little discussion on the growth of supply sources. Moreover, with a resurgent global market, the developments in the local marketplaces of medicinal plants are still largely unknown. The factors and policies that can create an enabled market situation for those primary producers who are literally ignorant of the value chain based on their produced goods are also largely missing in the global literature on the medicinal plant market.
World Health organization (WHO) has estimated that the present demand of medicinal plants is about US $ 14 billion a year and the projected demand by the year 2050 is US $ 5 trillion. Medicinal plant related trade in India is estimated to be around Rs. 550 crores per year. While the value of global trade in medicinal plants has been put at over $ 60 billion per year, of which India’s total turnover of Rs. 2300 crores (US $ 551 million) of Ayurvedic herbal products, major over-the-counter (OTC) products contribute around Rs. 1200 crores, other formulations fetch around Rs. 650 crores, while the classical Ayurvedic formulations contribute the remaining Rs. 450 crores. The export market for herbal medicines appears to be growing faster than the Indian domestic market, especially with encouraging magnitudes resulting from contract farming of species in demand in foreign markets. Again considering demand of individual species from export and domestic market also has a huge untapped potential for more than 500 species. The domestic market comprises of the formal industrial or pharmaceutical demand, and the demand of traditional practitioners. There is a consistent demand for the natural resources over long periods when they are used in domestic markets; while the demand for export markets has shown fluctuations. This has direct impact on the socio-economic conditions of the medicinal plant suppliers and cultivators. Therefore, it is urgently required to evolve appropriate strategies for supply linkages based on market tendencies. The largest importer of medicinal plants is Germany as it dominates the European market for Phyto pharmaceuticals. On an average Germany imports around 40,000 tons of botanicals and almost one third of the material is re-exported as finished plant based products primarily to Western Europe and the United States. North America is another important importing region for medicinal plants. The North America health products market is a fast growing market and its demand for medicinal plants is significant. Generally most of the countries in Asia, Africa and Latin America use traditional medicine to meet primary health care needs. The industrialized countries have started realizing the potential of traditional medicine and they denote and use it as a complementary or alternative medicine. In China, traditional herbal preparations account for 30-50 percent of the total medicinal consumption.

The Chinese government has prioritized “The Chinese System Medicine” (TCM) as an important area of development. The policy of the Chinese Ministry of Public Health is to strengthen the village doctors’ network and increase the extent to which
TCM is used in western medicinal hospitals as well as increase the number of TCM hospitals. Chinese policy for the industry is implemented by the State Administration of Traditional Chinese Medicine and has been defined as follows:

* Establishing comprehensive scientific research facilities.
* Expanding R & D of new and improved Chinese medicines.
* Improving the industrial quality of Chinese medicine through technological progression
* Raising the industry’s standards to western level.
* Increasing exports to western markets.
* Expanding the use of Chinese medicines in emergency care.

Out of the Total number of medicinal plants in China, 1000 are in common use. Of these, 200 are cultivated and the remaining, 800 are wild harvested. Chinese consider wild harvested materials as medically more effective. In Africa, about 80 percent population use traditional medicine for primary health care. At least once, about 50 percent population in Europe and North America, 70 percent population in Canada, and 90 percent population in Germany use complementary medicine. Besides, in San Francisco, London and South Africa, 75 percent of people infected with HIV / AIDS use traditional medicine (Bagozzi, 2003).

**Role of medicinal herbs/plants and their significance at the local level**

Medicinal plants form an important part of human life. A global assessment shows that around 50,000 plant species are known to be used traditional and modern systems of medicine across the world and when we look at our country it is around 65000 species. It is estimated that between 60-80 % of India’s population, particularly rural folk, they rely substantially on medicinal plants for health care.

The role of medicinal plants is immense to public health as these plants form the basis of traditional or indigenous systems of healthcare used by the majority of the population of most developing countries (Bodeker, 1997). The importance of medicinal
plants as sources of therapeutic agents and contributors towards health care programs and economies of both developing and industrialized countries is well established (Wheelright, 1974). According to World Health Organization (WHO), over 80% of the world’s population relies upon traditional plant-based systems of medicines to provide them with primary health care (Bannerman et al., 1983). Fransworth and Soejarto (1991) and Shengji (2001) also echoed the same with their estimation that 70-80% of people worldwide rely chiefly on traditional herbal, medicine to meet their primary healthcare needs. In the developed countries also, some 25% of prescriptions are filled with drugs whose active ingredients are extracted or derived from plants (Boerdeker, 1997). In South and South East Asia, including China, traditional systems of medicine use thousands of plant species to treat malaria, stomach ulcers, and various other disorders. Medicinal plants are used at the household level, especially by the women taking care of their families, at the village level by medicine men or tribal’s, and by the practitioners of classical traditional systems of medicine, such as the Ayurveda, Chinese medicine, or Japanese Kampo system (Bannerman et al., 1983). Medicinal plants are socially acceptable employment avenues for women. Traditionally, women have been involved in medicinal plant-based activities and micro enterprises because the products and activities there of easily fit within the average daily needs and work schedules of women. These typically include medicinal plant raw materials that are collected, dried and transported to the market. Medicinal plants have also been used to develop family-based health and livelihood oriented enterprises in rural areas. Many traditional healers have been running medicinal plant-based health care systems to earn their livelihoods. Arya Vaidya Sala (AVS) and Kabiraj ghar in South Asia are excellent examples of combining business and traditional medicine services. Such industries not only strengthen the social fabric, but also help: a) preserve the traditional medical knowledge, and b) provide easily adaptable enterprising opportunities for unemployed youth and rural poor who can learn the trade from their parents and peers and earn not only their livelihood but also contribute to the society (Karki, 2000). In Udham Singh Nagar, these health systems are essential to people of rural communities, Adivashi (aboriginal), Pahari (hill dwellers) and tribal origin, because of the lack of formal primary health care networks. Many traditional treatment centers exist in the rural areas, typically operated from the home of healers such as bone setting centers, herbal centers for mentally derailed people and a snake-bite herbal centers. The contributions of medicinal plants can be divided into three different but mutually inclusive philosophies and forms of application.
Chart 1: Based on the knowledge gained by interacting with the traditional medicinal practitioners of Udham Singh Nagar

These are associated with popular or folk medicine, alternative medicine and modern western medicine (WWF, 2000). Popular or folk medicine is a non- or little institutionalized, individual, family or tribal use of medicinal plants. It is the oldest form of medicinal therapy that has survived in most countries until the present day. Even in the highly industrialized countries one may still find some rural women or men expert in herbal lore, who walk through woods and pastures and collect medicinal herbs for their own, their families’, the monastic or local use (Hamilton, 1997).

Alternative medicine like Ayurveda, Siddha, and Unani, where therapeutic agents are derived from plants, contribute not only to the public health of developing countries but also to the developed ones. In such systems skilled physicians or Traditional
Medicine Practitioners (TMPs) conduct the medicinal plant mixtures individually, considering both the disease and the constitution of the patient. The use of such alternative medicines has become increasingly popular in the developed world. For example, one in three Americans have at some time used unconventional medical therapies according to a national telephone survey published in the New England Journal of Medicine in 1993. In another survey conducted in 1994, it was found that 60% of doctors had at some time referred patients to practitioners of alternative medicine. In response to the overwhelming interest in alternative therapies, many of the prestigious allopathic medical institutions have also had their importance recognized; an example is the National Institute of Health in USA, which created the Office of Alternative Medicine in 1991 to provide the public with information on alternative treatments and to assess those therapies which have proven successful (Kolata, 1996). Modern allopathic medicine too owes an immense debt to medicinal plants. One in four prescriptions filled in a country like the United States are either a synthesized form of or derived from plant materials (Lambert et al., 1997). Even many drugs are directly extracted from plants and others are made from the transformation of chemicals found within them. However, Mendelssohn and Balick (1995) believe that there are undoubtedly many more secrets still hidden in the world of plants from which the modern medicine system can benefit. Still in the 21st century world, in most developing countries, especially in rural areas, what comes first to the mind of people, parents or patrons when faced by most illnesses, is to seek out some plant species or plant material as an agent to alleviate the illness. Therefore, the place and importance of medicinal plants both to the local people and to most systems of medicine is insurmountable.

Herbs have always been the principle form of medicine in India and presently they are becoming popular throughout the developed world, as people strive to stay healthy in the face of chronic stress and pollution, and to treat illness with medicines that work in concert with the body’s own defense system. People in Europe, North America and Australia are consulting trained herbal professionals and are using the plant medicines. Medicinal plants also play an important role in the lives of rural people, particularly, in the remote parts of developing countries with few health facilities. The variety and sheer number of plants with therapeutic properties is quite astonishing. It is estimated that around 70,000 plant species, from lichens to towering trees, have been used at one time or another for medicinal purposes. The herbs provide the starting
material for the isolation or synthesis of conventional drugs. In Ayurveda about 2,000 plant species are considered to have medicinal value, while the Chinese Pharmacopoeia lists over 5,700 traditional medicines, most of which are of plant origin. About 500 herbs are still employed within conventional medicine, although whole plants are rarely used.

In India, medicinal plants have made a good contribution to the development of ancient Indian Material Medica. One of the earliest treatises on Indian medicine, the Charak Samhita (1000 B.C.), records the use of over 340 drugs of vegetable origin. Most of these continue to be gathered from wild plants to meet the demand of the medical profession. Thus, despite the rich heritage of knowledge on the use of plant drugs, little attention had been paid to grow them as field crops in the country till the latter part of the nineteenth century.

During the past one century there has been a rapid extension of the allopathic system of medical treatment in India. It generated commercial demand for pharmaceutical drugs and their products in India. Efforts have been made to introduce many of these drug plants to farmers. Several research institutes have undertaken studies on the cultivation practices of medicinal plants, which were found suitable and remunerative for commercial cultivation. The agronomic practices for growing poppy, isabgol, senna, cinchona, ipecac, belladonna, ergot and few others have been developed and there is now localized cultivation of these medicinal plants commercially.

During the past decade, a dramatic increase in exports of medicinal plants attests to worldwide interest in these products as well as in traditional health systems. In the last 10 years, for example, India’s herbs/medicinal plants export have trembled. But with most of these plants being taken from the wild, hundreds of species are now threatened with extinction because of overharvesting, destructive collection techniques, and conversion of habitats to crop-based agriculture. For instance, the small coniferous Himalayan yew (Taxus baccata) has recently become a heavily traded species. Similarly, senna is being grown extensively in arid region of India.

For past couple of decades, medicinal plants have been increasingly recognized for their role as not only for health care but also contributing to livelihood. Also, increasing commercialization has led to the overharvesting of some economically
important medicinal plants species, many of which have become rare, endangered and threatened. Since medicinal plants form an important health commodity and livelihood option, sustainable utilization and conservation of this valuable bio-resource is an urgent need of the hour. At the same time, there has been continuous erosion in the traditional knowledge on the use of medicinal plants due to several reasons including lack of proper documentation. Realizing the loss of valuable traditional knowledge on plants use for health care in the past and the increasing interest in herbal therapy at present, there was a need to compile information on medicinal plants.

The impact of Ayurveda on the public mind in India was so profound that even under Islamic and British rule people retained their faith in it and it was widely practiced in spite of the negative attitude of the rulers. People in remote areas of the country depended solely on medicinal herbs for treating diseases because the Greek (Unani) and Allopathic medicines were not available. Even today people in remote villages and the tribal’s in far flung areas have great faith in the effectiveness of the medicinal herbs provided by nature. Rich and vast traditional experience and knowledge of herbs is still available in villages and tribal areas, but not much consolidated effort has been made to preserve and disseminate this valuable information. On the other hand it is becoming quite clear that people are not convinced about the efficacy of allopathic medicines which provide quick relief but also produce other undesirable effects leading to new problems. Medicinal herbs do not have such side effects. In addition the cost of the treatment is constantly increasing and is burdensome. People are also getting frustrated by the inordinate delay in getting proper treatment and with the callous behavior of the doctors in some cases. Ayurvedic treatment is relatively inexpensive especially for common diseases like cold, cough, headache, stomach and skin disorders that can be treated with easily available herbs. Therefore, a thorough knowledge of the herbs and of the methods of their use becomes all the more important.

The Indian systems of treatment lay adequate stress on balanced diet and on inclusion of specific items in food to provide immunity against diseases. Also, number of plants products with medicinal properties form constituents of food. Even spices are being found to have medicinal properties. For example, capsicum, garlic, turmeric, onion, ginger, black pepper, cinnamon, curry leaf, lemon grass etc. have been found to protect against various health problems as well provide cure from certain diseases.
Medicinal plants have been in India since time immemorial and cater to the needs of about 80% of Ayurvedic, 46% of Unani and 33% of allopathic medicines. The collection and trade in medicinal plants constitute a major share of the livelihood means of the forest dwellers, forest department people and other people trading in medicinal plants. Out of about 47,000 plant species in the country, about 15,000 have medicinal value. Millions of rural households use medicinal plants in traditional medicines. Over 80% of world population meets their health care needs through traditional medicines. The traditional Indian Ayurvedic medicines account for 70% share of the formal medicine market in India.

MEDICINAL PLANTS AND HERBS – NATIONAL SCANNING

India is endowed with a wide spectrum of bio-diversity in plants genetic resources and is to be recognized as one of the world’s top 12 mega diversity nations. It possesses rich flora that include about 45,000 species and many are accredited with medicinal value. Over 15,000 species are used in different systems of health care in Asia (7,000 in China and 8,000 in India). However, available information shows that 1,700 species are used in Classical Indian systems of medicines. Ayurveda uses 1,200, Siddha – 900, Unani – 700, Amchi – 600, Tibetan – 450. These raw materials are obtained from the forests only, where only a few plants are under cultivation. Despite, the close relationship between the forest and pharmaceuticals, very little effort has been made to maintain, manage and develop technology for conservation of these medicinal plant resources of the Indian forests. The estimated 95% of medicinal plants collected in India are from the wild and process of collection is said to be destructive because of the use of parts, like roots, barks, wood and whole plants. An estimate of the parts used by Ayurvedic industries are: roots – 29.6%, leaves – 25.8%, bark – 13.5%, wood– 2.8%, whole plant – 16.3% and rhizome – 4% and rest: seeds, flowers etc.

The Himalaya harbors a great diversity of medicinal plant species. The northeast Himalaya due to rich array of biodiversity has placed with eighteen-biodiversity hotspots of the world. A major part of the high range Himalayan plants are wild harvested and many of these are close to extinction due to over-harvesting or unskilled harvesting, e.g., Nardostachys jatamansi, Aconitum species. Due to over-harvesting, several medicinal plants occurring in the forest areas of tropical, sub-tropical, temperate and alpine zones
have either become extinct or endangered. Consequently efforts are needed to develop methods for in-situ and ex-situ cultivation / propagation of such medicinal plants which have been overharvested resulting in low density of these species in nature. It is, therefore, argued that cultivation of such species could relieve the pressure on the natural habitat and will meet the market demand. Concerted efforts are lacking in the area of biotechnology and agro technology for encouraging cultivation on private or Government land. Similarly marketing, which is one of the most important aspects in the development of any product of medicinal herbs be given adequate attention in formalizing and organizing the disposals. Quality control and standardization are integrals to boosting export. The quality of medicinal plant also depends on the geographical origin, time and stage of growth. Thus time of collection, post harvest handling and their completing are important. The villagers / tribal’s mostly residing in the vicinity of Forest and in forest fringe areas do the collection in their spare time. The plant part is collected without paying attention to the stage of maturity, is dried haphazardly and stored for long periods under unsuitable conditions. Thus the quality of collected material as such is often deteriorated.

![Diagram](image)

**Figure 2:** Distribution of medicinal plants by habitat
Figure 3: Distribution of medicinal plants\herbs by families

Species available in Phyto-climatic Zones in India

Our country is divided into Tropical, Sub-Tropical, Temperate and Alpine zones. The following medicinal plants are found in different Phyto-climatic zones:-

1. **Tropical zone**: Acorus calamus, Adhatoda vasica, Aristolochia indica, Azadirachta indica, Cassia fistula, Commiphora mukul, Datura metel, Evolvulus alsinoides, Gloriosa superba, Mucuna prurita, Psoralea corylifolia, Pueraria tuberosa, Tinospora cordifolia, Tylophora indica, Withania somnifera, Chlorophyton arunndinaceum, Strychnos mux-vonica.

2. **Sub-tropical zone**: Acorus calamus, Alpinia galanga, Asparagus adscendens, Curcuma zedoaria, Holarrhena antidysenterica, Urginca indica.

3. **Temperate zone**: Aconitum chasmanthum, Artemisia maritima, Berberis aristata, Bergenia ciliata, Colchicum luteum, Daphne papyracea, Datura stramonium, Dioscorea deltoidea, Fagopyrum esculentum, Heracleum candicans,
Podophyllum hexandrum, Rheum emodi, Swertia chirata, Urginea indica, Viola odorata, etc.

4. **Alpine zone:** Nardostachys jatamansi, Picrorrhiza kurroa, Dactylorhiza hatagirea, Hyssopus officinalis, Aconitum heterophyllum, A. balfourii, Dictamnus albus, Ephedra geraradiana, Gentiana kurroa, Jurinea dolomiae, etc.

Association between plants and man predates history. To the early man, trees must have been objects of special wonder, because of their sudden appearance from the seeds, then growing to large sizes, bearing leaves of different sizes and colors, followed by equally fascinating flowers and fruits containing seeds which in turn gave rise to the same kind of trees. To him, all these events symbolized creativity, youthfulness, beauty, fertility and perpetuation of life. Plants and trees not only fertilize their own soil, but they also give us tangible lessons on life, death and rebirth. In Indian culture they have come to symbolize eternity, constancy and unity of nature. They were considered to have bigger and fuller life than people and so they deserved respect and reverence. India is rich in its tribal population from the ancient times with traditional knowledge system which deals with various important aspects and the health issues of the local people.

Generally people get their treatment done from the local practitioners and their own herbal preparations. The use of the herbal medicines by the local people and the tribes is highly influenced by district socio-cultural practices, beliefs, support of traditional authority and services of local traditional practitioners. The people living in Udham Singh Nagar have a close relationship with their ambient environment and basically depend on it in remote localities far away from modern facilities. The local people are the protectors & preservers of ecosystem, they live in a close harmony with the nature and maintain a close relationship between man and environment and indigenous cultures are closely maintained by the local people, tribes and other forest dwellers of that particular area. According to World Health Organization (WHO), as many as 80% people of the world rely on traditional medicine for their primary health care. The documentation of traditional knowledge on medicinal plants is considered (Anonymous 1994; Cox 1994) to support the discoveries of new drugs for the benefit of mankind.
History of Uttaranchal

Literally North Country or section in Sanskrit, the name of Uttarakhand finds mention in the early Hindu scriptures as the combined region of Kedarkhand (present day Garhwal) and Manaskhand (present day Kumaon). Uttarakhand was also the ancient Puranic term for the central stretch of the Indian Himalayas. It is well-known for the presence of a multitude of Hindu pilgrimage spots. The Pauravas, Kushanas, Kunindas, Guptas, Katyuris, Raikas, Palas, the Chands, and Parmars or Panwars and the British have ruled Uttarakhand in turns. The region was originally settled by Kols, an aboriginal people of the austro-asian physical type who were later joined by Indo-Aryan Khas tribes that arrived from the northwest by the Vedic period. At that time, present-day Uttarakhand also served as a haunt for Rishis and Pandavas are believed to have traveled and camped in the region. Among the first major dynasties of Garhwal and Kumaon were the Kunindas in the 2nd century B.C. who practiced an early form of Shaivism. They traded salt with Western Tibet. It is evident from the Ashokan edict at Kalsi in western Garhwal that Buddhism made inroads in this region. Folk shamanic practices deviating from Hindu orthodoxy also persisted here. However, Gharwal and Kumaon were restored to nominal Brahmanical rule due to the travails of Sankaracharya and the arrival of migrants from the plains. Between the 4th and 14th centuries, the Katyuri dynasty of khas origin dominated lands of varying extent from the Katyur (modern day Bajinath) valley in Kumaon. The historically significant temples at Jageshwar are believed to have been built by the Katyuris and later remolded by the Chands. Other peoples of the Tibeto-Burman group known as Kiratas are thought to have settled in the northern highlands as well as in pockets throughout the region, and believed to be the ancestors to the modern day Bhotiya, Raji, Buksha, and Tharu peoples.

By the medieval period, the region was consolidated under the Garhwal Kingdom in the west and the Kumaon Kingdom in the east. From the 13th -18th century, Kumaon prospered under the Chand Rajas who had their origins in the plains of India. During this period, learning and new forms of painting (the Pahari school art) developed. Modern-day Garhwal was likewise unified under the rule of Parmar/Panwar Rajas, who along with a mass migration of Brahmmins and Rajputs, also arrived from the plains. In 1791, the expanding Gurkha Empire of Nepal overran Almora, the seat of the Kumaon Kingdom. In 1803, the Garhwal Kingdom also fell to the Gurkhas. With the conclusion
of the Anglo-Nepalese War in 1816, a rump portion of the Garhwal Kingdom was reestablished from Tehri, and eastern British Garhwal and Kumaon ceded to the British a part of the Treaty of Sugauli.

In the post-independence period, the Tehri princely state was merged into Uttar Pradesh state, where Uttarakhand is composed the Garhwal and Kumaon Divisions. Until 1998, Uttarakhand was the name most commonly used to refer to the region, as various political groups including most significantly the Uttarakhand Kranti Dal (Uttarakhand Revolutionary Party 1979), began agitating for separate statehood under its banner. Although the erstwhile kingdoms of Garhwal and Kumaon were traditional rivals with diverse lingual and cultural influences due to the proximity of different neighboring ethnic groups, the insparable and complementary nature of their geography, economy, culture, language, and traditions created strong bonds between the two regions. These bonds formed the basis of the new political identity of Uttarakhand, which gained significant momentum in 1994, when demand of separate statehood (within the Union of India) achieved almost unanimous acceptance among the local populace as well as political parties at the national level. Most notable incident during this period was the Rampur Tiraha firing case on the night of 1st October 1994, which led to public uproar.

On 24 September 1998 Uttar Pradesh Legislative Assembly passed the Uttar Pradesh Reorganization Bill, 1998, which eventually led to the creation of the state, eventually the Parliament passed the Indian Federal Legislation-Uttar Pradesh Reorganization Act 2000, and thus on 9 November 2000, Uttarakhand became the 27th state in the Republic of India.

However, the term Uttaranchal came into use when the Bhartiya Janta Party (BJP)-led central and Uttar Pradesh state governments initiated a new round of state reorganization in 1998 and introduced its preferred name. Chosen for its allegedly less separatist connotations, the name change generated enormous controversy among the rank and file of the separate state activists who saw it as a political act; however they were not quite as successful as Jharkhand state that successfully thwarted a similar move to impose the name Vananchal. Nevertheless, the name Uttarakhand remained popular in the region, even while Uttaranchal was promulgated through official usage.
In August 2006, India’s Union Cabinet assented to the four year old demand of the Uttaranchal state assembly and leading members of the Uttarakhand movement to rename Uttaranchal state as Uttarakhand. Legislation to that effect was passed by the State Legislative Assembly in October 2006, and the Union Cabinet brought in the bill in the winter session of Parliament. The bill was passed by Parliament and signed into law by the President in December 2006. Since then, Uttarakhand denotes a state in the Union of India.

The herbal sector in Uttarakand in recent years, there has been a rapid growth in world demand for plant based raw materials for the manufacturing of food flavors, fragrances, perfumes, cosmetics and other related products. Some of these are high level chemicals and their demand; individuality may command a sizeable chunk of the global market. Traditionally India has been an important source for the procurement of a wide variety of medicinal and aromatic plants. The Central Government through the Ministries of Agriculture and health has been steadily trying to give a strong push to an herbal movement in the country. In 2003, the State Government of Uttarakhand took a formal policy decision to promote herbal civilization in the state. As a part of this policy decision the GOUK has prioritized 26 herb species for mass scale cultivation and has decided to provide a 50 percent subsidy on the cost of cultivation to boost the process of inducting an herbal movement in the State.

Geography

Uttarakhand has a total geographic area of 53483 km², of which 93% is mountainous and 64% is covered by forest. Most of the northern parts of the state are part of Greater Himalaya ranges, covered by the Himalayan peaks and glaciers, while the lower foothills were densely forested till denuded by the British log merchants and later, after Independence, by forest contractors. Recent efforts in reforestation, however, have been successful in restoring the situation to some extent. The unique Himalayan ecosystem plays host to a large number of animals (including bharal, snow leopards, leopards and tigers), plants and rare herbs. Two of the India’s mightiest rivers, the Ganges and the Yamuna take birth in the glaciers of Uttarakhand, and are fed by myriad lakes, glacial melts and streams in the region.
Uttarakhand lies on the southern slope of the Himalaya range, and the climate and vegetation vary greatly with elevation, from glaciers at the highest elevations to subtropical forests at the lower elevations. The highest elevations are covered by ice and bare rock. Below them, between 3,000 and 5,000 meters (9,800 and 16,000 ft) are montane grasslands and shrub lands: the western Himalayan subalpine conifer forests grow just below the tree line. At 3,000 to 2,600 meters (9,800 to 8,500 ft) elevation they transition to the temperate western Himalayan broadleaf forests, which lie in a belt from 2,600 to 1,500 meters (8,500 to 4,900 ft) elevation. Below 1,500 meters (4,900 ft) elevation lie the Himalayan subtropical pine forests. The Upper Gangetic Plains moist deciduous forests and the drier Terai-Duar savanna and grasslands cover the lowlands along the Uttar Pradesh border. This belt is locally known as Bhabhar. These lowland forests have mostly been cleared for agriculture, but a few pockets remain. Indian National Parks in Uttarakhand include the Jim Corbett National Park (the oldest national park of India) at Ramnagar in Nainital District, Valley of flowers National Park and Nanda Devi National Park in Haridwar District, and Govind Pashu Vihar National Park in Uttarkashi District.

The Himalayas have a great wealth of medicinal plants and traditional medicinal knowledge. The Central Himalayan Region covers the new state of Uttaranchal, which includes the major divisions of Kumaon and Garhwal. This region has played a significant role in the historical processes of Northern India and provides a mini model for understanding the Indian civilization processes. Through the millennia different tribes and people – Protoaustroloids, Mudas, Kiratas, Mongoloids, Indo-Aryans, Khasas, Sakas and others – have been coming in and leaving their signatures and producing a mosaic of cultures. The people of the Himalayas are a racial mixture of various tribes. Shah quotes in his article that the Vishnupuran, the Mahabharata, etc., mention a number of tribes such as the Sakas, the Nagas, the Kirats, the Hunas, and the Khasas dwelling on the border of India, which may be referred to the portion of the Himalayas known as Kumaun. The Sakas are pointed out to be among the earliest ruling people of the Kumaun Hills. The Kirats, or Rajya Kirats, were a tribe of forest dwellers, whose descendents can still be found in some interior regions like Askot. The Khasas are numerically the most important people in the Kumaun hills, and the Kshatriya class is still locally known as Khasias.
In this region the majority of the population speaks Pahari (Kumauni and Garhwali) dialect but some tribal people like Bhotia, Rajis, Tharus, etc. have their own dialects. The Himalayan people are simple, superstitious, God fearing people with their own customs, traditions and folklore.

It is interesting to note that in this region the local Gods and Goddesses are more powerful than the Brahmanical Gods. Such local Gods perhaps go back to the prehistoric times. The cultural groups of the Central Himalayan Region include the Kumauni’s, Garhwali’s, and some tribes like Bhatia’s, Rajees, Tharus, Boxas, Jaunsarees, which have their own different cultures, traditions, languages, customs, etc. Thus the Central Himalayas provide excellent opportunities for studying the Traditional Knowledge systems.

The Himalaya is considered as one of the most important botanical regions of the world. Kumaun region comprising of the districts of Almora, Bageshwar, Champawat, Nainital, Pithoragarh and Udham Singh Nagar lies approximately between 28°43’ to 30°47’N; 78°44’ to 81°4’E. Wide diversities in soils, altitudes and climate provide such an environment which has generated different types of vegetation ecosystems (Source: Himalaya Environment Resource and Development, 1990).

Uttarakhand, the 27th state of India which was created in 2000. It is often referred as the Land of Gods. It is a place blessed with the beauty of heaven and the grace of Gods. This is the place where the rivers passing through the huge rocks and wind passing through large pine trees produces a natural melody by itself. It is one of the most beautiful states in the Indian union. Apart from the beautiful views of Himalayas, it is also home of the point of origin Ganga and Yamuna, Gangotri, Yamunotri, Badrinath and Kedarnath are some of the places regarded sacred by Hindus. Uttarakhand is comprised of two regions, the western half known as Garhwal and the eastern region known as Kumaon, the two having different chieftains in history and different lingual and cultural influences due to proximity and neighborhood of different cultures. Inseparable and complementary nature of their geography, economy, culture, language and traditions, however, has formed strong bondages between the two regions.
Uttarakhand borders China in the north and Nepal to the east, while its neighbor states are Himachal Pradesh to the west and Uttar in the south. The region is traditionally referred to as Uttarakhand in old literature and scriptures which derives from the Sanskrit for North Country. The provisional capital of Uttarakhand is Dehradun which is also a rail-head and the largest city in the region. The small hamlet of Gairsen has been mooted as the future capital owing to its geographic centrality but controversies and lack of resources have led Dehra Dun to be the provisional capital. The High Court of Uttarakhand is situated in Nainital though most of the litigation is in Dehradun or Haridwar. Uttarakhand one of the Himalayan states has been created in November 2000. This forms the western Himalayan region of Himalayas in India. Uttarakhand is endowed with rich biodiversity having species from tropical to alpine zone. Western Himalayas are complex system where the topography, drainage system, geology and the vegetation vary greatly from one place to another. Hence no two geographical units in the area present the same set of conditions. The role of the forests and vegetative cover is well known in absorption and retention of precipitation in the land. Forests have major role to play in maintaining the environmental stability. Uttarakhand has 3466152 hectare of land classified as forests which is about 65 % of the total geographical area. Forests are one of the most important resources of Uttarakhand and have direct role in the economy of Uttarakhand not only by meeting the people's day to day needs of fuel, fodder and timber but also by providing employment and economic opportunities to the people in far flung interior areas. Most important role of forests in the watersheds of this region lies in their environmental and protective functions. The geology and forest cover are main factors which determine the stream flow, water regime and recharging of water resources.

Uttarakhand comprises of 13 districts. Main species found in these forests are Chir pine, Deodar, Kail, and miscellaneous forests and their associates besides many herbs medicinal plants. Uttarakhand is endowed with all kinds of biodiversity. It has been the tradition of people of Uttarakhand to use vegetative medicines for their health care, and it is also a fact that majority of these herbs and plants are extracted from forests. Mainly due to the increased awareness about the limitations and ill effects of modern medicine and chemicals, the demand of herbal medicines has increased all over the world. World community is going in a big way towards herbal medicines. It is an established fact that the medicinal plants provide safer alternative to solve the health problems. The use of herbs to cure the ailments is not new to the people of Kumaon. The
people of the Kumaon have been using the herbs found in wild forests for their better health management. Trees, shrubs and herbs have been in use as medicines since the time of evolution of mankind. Again the world has come back to herbal medicines from the use of chemical and modern medicines. The basic draw-back is unscientific extraction of the medicinal plants, herbs which has adversely affected the very existence of medicinal plants. Work in this direction has already started. The Surveying and listing of the medicinal plants available in the forest areas, declaration of medicinal plant conservation areas, establishment of herbal gardens and nurseries, registration of medicinal plant growers, signing MOU with pharmaceutical companies are few works done by the department. The constraints we face during management of herbs and medicinal plants are due to Himalayas, being the youngest mountain range in the world is still under going continuous process of change. Here, the land is still in search of its final form. Heavy rains over limited period of monsoon months results in excessive run-off of water and silt through the Himalayan slopes and streams. Therefore the region is very susceptible to the accelerated erosion and slope filatures. Natural resources comprising land, forest and water constitute the basic support system of life on earth. Management of the natural resources, on a sustainable yield basis, depends upon the careful manifestation of the policies and management practices.

Reduction in forest cover is the most striking aspect of forest change in developing countries, less attention is paid to forest condition. Although the extent of over harvesting of fuel wood and over grazing are difficult to quantify, they are recognized as major causes of forest degradation in some developing countries, particularly in arid and semi-arid zones. Fires, pest and diseases are also critical factors in forest health in these countries (FAO, 1997). Soil and land use have become extremely competitive, not merely in India but all over the world, because of the tremendous pressure of the population explosions in the recent years. There have been increasing demands on fodder, food, fuel and fiber in the agriculture sector, whereas concomitant claims on the land for few settlements, urban growth, industrial expansion, roads and host of other public facilities are on constant rise. The National Board, The National Land Resources Conservation and Development Commission and State Land Use Board are engaged in formulation of policies, master plans and Implementation program for optimizing land use for various purposes. 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 has occurred during the past 100 years. For geologists, topographical and anthropogenic reasons, the Himalayan ecosystems are ecologically fragile. They are also banks of tremendous bio-diversity. Large scale human activities in the region, mainly in the past few decades, particularly excessive deforestation intensive farming on steep slopes, heavy human and livestock pressure on soil, water and biological resources have resulted in overall environmental degradation and depletion of life support systems (ICIMOD, 1993).

The geographic, socio-economic and cultural identity of the western Region is unique as compared to the rest of the country. Most of the people in this region are highly dependent upon renewable natural resources. The topography resources and land use pattern in the western Himalayan Region are also markedly different from plain areas. The hill areas posses an entirely different set of problems, opportunities, strengths, limitations threats and weaknesses as compared to the plain where the land is more or less leveled. Hence, it is, but natural that the problems of the hill region and the solutions there of should be looked into and analyzed keeping in view these peculiarities of the region, in view of the rich biodiversity of flora and fauna.

Uttarakhand Government has adopted Brahma Kamal (Saussurea Obvallata) as state flower, (Lophophoris impeyanus) as state bird, Himalayan Musk deer (Moschus Moschiferus) as state animal and Burans (Rhododendron Arboerum) as state Tree. Land, forests and water are the primary natural resources in the watersheds of western Himalayas which have always attracted the attention of the policy makers, Govt. departments, research institutions, scientists, activities, social workers, politicians, local inhabitants and the different donor agencies. Out of many issues influencing the management of these natural resources, the role of various institutions, participation by stake holders and equity in terms of access to resource use and decision making in their management have always been central.

These core issues have in turn been influenced by the dynamic process of interactions of different stake holders based on their interests and experiences with different approaches hitherto practiced. In Himalayan Region various developmental models with variety of delivery systems have been tried in the past. These include departmental bureaucratic models and community based participatory models, where
most of the times people were asked to participate in pre-determined programs. Few programs have some flexibility where the local people have options to choose the activities as per their needs within some broadly defined parameters.

Uttarakhand is a region of outstanding natural beauty. Most of the northern parts of the state are part of Greater Himalayas ranges, covered by the high Himalayan peaks and glaciers, while the lower hills were densely forested till denuded by the Britain log merchants and forest contractors after independence. Recent efforts in afforestation however have been successful in restoring the situation to some extent. The unique Himalayan ecosystem plays host to a large number of animals (including bharal, snow leopards, leopards and tigers), plants and rare herbs. Two of India’s mightiest rivers, the Ganga and the Yamuna take birth in the glaciers of Uttarakhand, and are fed by myriad lakes, glacial melts and streams in the region.

The tourism industry is a major contributor to the economy of Uttarakhand, with the Corbett National Park and Tiger Reserve and the nearby hill-stations of Nainital and Bhimtal and several other hill-stations like Mussoorie, Almora and Ranikhet being among the most frequented destinations of India. To this region also belong some of the holiest Hindu shrines, and for almost 2000 years now, pilgrims have been visiting the temples near Haridwar, Badrinath, Kedarnath and Jageshwar in the hope of salvation and purification from sin. Rishikesh near Haridwar has the major spiritual and yoga centers of India. Gangotri and Yamnotri, the sources of the Ganges and Yamuna also fall in this region and are revered by many. Besides these are most important pilgrim centers, the state has an abundance of temples and shrines, references to most of which can be found in Hindu scriptures and legends. The architecture of most of these temples is typical of the region and slightly different from other parts of India, the ancient temples at Jageshwar being the most popular for their architectural importance.

Recent developments in the region include initiatives by the state government to capitalize on the burge ongoing tourist trade as well as tax incentives to lure high-tech industry to the state. The state also has big-dam projects, controversial and often criticized in India, such as the very large Tehri dam on the Bhagirathi-Bhilangana Rivers, conceived in 1953 and about to reach completion. Uttarakhand is also well known as the
birth place of the Chipko environmental movement, and a myriad other social movements including the mass agitation in the 1990s that led to its formation.

**Current status of forest in India**

Present status, forests have great value in India, nearly seventy four million hectares of Indian land is legally declared as ‘Forests’, however not all of this is adequately covered by vegetation according to the interpretation of the latest available satellite imageries. The Forest cover is approx 64 million hectares. As a matter of fact only 37 million hectares of coverage can only be described as having proper tree cover. This is hardly four percent of the total geographical area of the country which indicates a very disappointing and distressing situation in the light of the fact that at the time of Independence more than 28.63 % of the India’s geographical area was covered by dense forests though it was also much below the national objective of having 1/3 of the geographical area under proper tree cover.

Forests of India are disappearing very fast and the rate of deforestation is causing great concern to everyone in the country. The people during older times could easily meet the requirements of fuel wood, small timber, grass, fruits, seeds, gum, herbs and plants of medicinal use etc. Fuel wood the essential item of daily consumption of the villagers was locally available at no cost. The real problem started with the rapid growth of population which resulted in increasing demand of fuel wood and other forest products and large scale deforestation took place for clearing land for agricultural, housing and industrial purposes. The fast rate of deforestation has resulted into several problems, such as medicinal plants and herbs of medicinal value are now becoming extremely scare, villagers particularly the women are traveling miles in the forest to collect the leaves, twigs root etc. due to the over exploitation of natural resources and particularly of forests, people of the region are facing scarcity of fuel wood and fodder, herbs and the plants of medicinal value.

To maintain the ecological balance there must be forest in the sixty six percent of the total geographical area in hills, but today it has come down to about forty eight percent. One of the major achievements of the social forestry has been an increasing awareness and the importance of people’s participation for the developmental programs,
whether administered through government or the voluntary organization or other social agencies. People’s participation in a real sense is more than the simple involvement of the people in the induced action of community forest and the land development.

Voluntary Organizations also referred as NGOs, are recognized to have great potentialities for securing public co-operation and participation in different development programs. The NGO’s are successful in inducing the participation of rural communities. This is because the NGO’s have great freedom to adopt themselves to the need and idea and also to modify their methods from place to place according to emerging demands of the community and situation. People’s participation in Social Forestry is one of the most important dimension of the forestry development, is the policy of Government of India. The NGO’s cover a wide spectrum of activities i.e., Forestry, herbs, agriculture, health, developing village economy and cottage industries, dairy farming and adult education, cultivation of medicinal herbs and plants.

Forests have to fulfill three sets of need in a developing economy.

(a) Ecological security
(b) Fuel Fodder and other domestic needs of the population and
(c) The need of wood based small and large scale industries, herbs and medicinal plants as an economic activity.

Proper Planning is essential for smooth performance of these three roles. For proper planning, it is essential to have a thorough understanding of site attributes and capabilities, not many studies have tried to understand these aspirations nor have they estimated the needs of the community that forest could meet.

If we ponder “What is Nature worth”? Then we would be stuck with its bounties. If humanity were to try to replace the free services of the natural economy with substitutes of its own manufacture, the global GNP would be increased by at least US $33 trillion. There is a powerful economic argument for preserving our living natural environment; the biosphere promotes the long term material prosperity and health of the human race to a degree that is almost incalculable. But moral reasons too, should compel us to take responsibility for the natural world. Very few nations have achieved the ideal
target of thirty one percent minimum forest cover of the total area in its territories and the importance of herbs and medicinal plants.

WWF states that 94% of the world’s forests are unprotected. Rate of depletion of forests is about 1.3 million hectares a year. The World’s forests are resource of incalculable value, yet they are being degraded and destroyed at a presidential rate. To evaluate the individual species solely by their known practical value at the present time is business accounting in the service of barbarism of the species, known less, than 1% has been studied beyond the sketchy anatomical descriptions used to identify them.

**Context and Problem Statement**

Plants that have medicinal properties with optimum active ingredients in some form or the other are regarded as medicinal plants. These are invaluable natural resources; they are exhaustible if they are overused and sustainable if the juxtaposition of present and future needs takes place within the behavioral pattern of various kinds of user. Uttarakhand is well-endowed with diverse complements of flora and fauna that include a considerable number of medicinal plant resources. The natural habitat of these medicinal plant resources, mainly natural forest has been facing an onslaught since the eighteenth century and consequently portion of them has already been lost. This has resulted in the loss of biodiversity. Factors which are affecting the loss of biological diversity include: population pressure, natural hazards, the overexploitation of the biological resources, deforestation, the destruction of the habitat, flood control related activities causing the destruction of the forest which are home of medicinal herbs and plants. Consequently, the increasing needs of a gradually increasing population have rendered poverty and caused pressures to the biotic resources including herbs and plants of medicinal value. In India medicinal plants are an essential part of traditional health care systems. In the case of most of the medicinal plants growing in Uttarchal exploitation is a common factor which often jeopardizes their future availability. Most of the local suppliers of the medicinal plants and herbs of medicinal value gather it in a very unplanned and indiscriminate ways which are at times so extensive and exhaustive that they exploit the plant species and leave no scope for the future regeneration (Ghani, 2003). The practice of medicine using medicinal plants flourished most during the Greek civilization, when historical personalities like Hippocrates (born 460 BC) and
Theophrastus (born 370 BC) practiced herbal medicine. The material medica by Hippocrates listed around 400 medicinal plants and later the encyclopedic work of Discordies, ‘De materia medica’ (published in 78 AD), which featured about 600 medicinal plants, have been regarded as the forerunners of all modern pharmacopoeias and authoritative texts on botanical medicine, Galen (131-200 AD), wrote about 500 volumes describing hundreds of recipes and formulations containing a large number of medicinal plants. He was the first person to describe the procedures and methods of preparing therapeutic recipes, including the ingredients of both plant and animal origins (Claus and Tayler, 1965). This doctrine, expatiated by Galen, has been the basis of allopathic and homeopathic systems of medicine practiced today.

Earlier medicinal plants which were found endemic in nature are gradually diminishing and impacting on the overall plant population in Uttaranchal. The collection of the medicinal plants by the local, rural and tribal as well as petty contractors causes biodiversity loss and resource depletion due to over extraction and their ignorance regarding the local natural resources (USAID, 2004). On the other hand the gradual loss of medicinal plants is continuing unabated, the demand for medicinal plants and plant-derived drugs is increasing rapidly with the current resurgence of traditional medicines all over the world (Ghani, 2003). There is unprecedented demand for natural medicines, green health products, pharmaceuticals, food supplements, cosmetics and herbal pesticides, which is bringing about this alarming loss of plant biodiversity. It is estimated that nearly 70-80% of people worldwide rely chiefly on traditional, largely herbal medicine to meet their primary healthcare needs (Fransworth and Soejarto, 1991; Shengji, 2001). The global market for medicine is not large but expanding by 15-20% annually (Subrat, 2002). In recent years, the Government of Uttaranchal has been emphasizing the need to strengthen the traditional medicine-based healthcare systems (Ayurveda, Unani, Homeopath) and the conservation and promotion of related plant species in order to take part in the 62 billion dollar global market (GoI, 2000) and enhance local public health. Traditionl knowledge and skills on these traditional medication systems are transmitted intergenerationally. The profession based on these systems e.g., Kabiraji, Hekimi, Baiddaya, are no longer financially lucrative to the potential practioners. This is the main cause due to which the traditional reserve is gradually eroding day by day. It is an important issue to understand the medicinal plant industry structure in terms of its production, growth, trade and associated strengths and
weaknesses, in order to point out a more efficient, profitable and sustainable system of marketing and management. Issues relating to marketing, management and conservation call for critical evaluation, especially with a view to converting community and industry level practices into more environmentally or biodiversity friendly ones that generate higher income.

**Medicinal Plant Management and Marketing – Challenges**

The over exploitation of the medicinal plants from *in-situ* sources is certainly posing a serious threat to natural resources. It’s an urgent need to use combined efforts by those concerned with the conservation of medicinal plant species or the healthcare systems dependent on them will be crucial to ensure the sustainability of the resources and healthcare (TRAFFIC, 1999). Moreover, the loss of traditional methods in resource management and the lack of an appropriate institutional arrangement have had an adverse effect on the people’s (primary producers) control over resources on which they depend for their sustenance (Jodah, 1991). Since the over-extraction of natural resources poses a threat to biodiversity, reconciliation between income generation (development) and conservation will be a realistic step to underpinning the goals of sustainable resource management and at the same time improving the livelihood security. Sustained and coordinated efforts, educational support, enriched vision is needed to transform unsustainable practices of medicinal plant collection from wild sources to more ecologically sustainable, socially acceptable and economically equitable production and utilization systems (Parotta, 2002). Across scale approach to bringing together collectors, buyers, regulators and local communities, who have hardly interacted before, would be a challenging but significant task in pointing out the problems associated with the extinction and depletion of the medicinal plant reserve in nature. In this respect, it is critical to bring together stakeholders so that they understand their distinct perspectives and comprehend the need to collaborate and co-operate to address the conservation of medicinal plants. In most cases, the whole production to consumption chain of medicinal plants, which is intermediary-driven, needs to be readdressed in such a way that an increased margin of benefit to the primary producers will encourage them to promote the practice of sustainable yield. The loss of biodiversity and the associated knowledge systems is a serious concern expressed by those with an interest in conservation and development (Gadgil et. al., 1993). Knowledge of medicinal plants embedded in rural
and indigenous culture is rapidly disappearing as every year, the sum total of human knowledge about the types, distribution, ecology, methods of management and methods of extracting the useful properties of medicinal plants declines rapidly. It is the continuation of a process of loss of local cultural diversity that has been underway for hundreds of years (Hamilton, 1997). The urgency and need to protect this fast disappearing medicinal plant-based traditional knowledge cannot be ignored, especially in the hilly regions of Uttaranchal where it is still abundant.

Exploration of this traditional knowledge on medicinal plants is crucial in order to promote the exchange of information about medicinal plants and conservation concerns as well as to improve the co-ordination of conservation efforts through sharing of experiences and lessons learned. Working with traditional medicinal practitioners to identify threatened medicinal plants and to understand important plant properties, their usage, and potential economic value can significantly benefit the understanding of conservation priorities and resource use. As the very survival and success of the medicinal plant industry lies in the easy and sustainable availability of sufficient quantities of medicinal plants, it is also crucial, for the long term viability of the medicinal plant sub-sector, to find out ways to bridge the gap between the awareness of local communities and user-bodies regarding environmental threats and the potential endangerment of medicinal plants. TRAFFIC (2002) has the view that, in today’s world with economic globalization, medicinal plant projects should be based on a sound understanding of the trade situation at local and international levels. Baseline research is essential to develop appropriate and scientifically based strategies. Market research will allow people to identify species in trade ascertain trade volumes and dynamics, identify source areas and end markets for plants and processed products, and, most importantly, contribute to assessing the impact that utilization and trade have on the status of medicinal plant species in the wild. The subsequent steps after the conservation and diversification of production are the challenges of creating a competitive economic value chain for any product to be sustained commercially and accepted globally. In this respect, it is very important to develop appropriate market and product strategies for the medicinal plant-based products in order to meet both the local and global trends for standardized quality. We still need to develop expertise and knowledge in setting suitable standards and have to maintain quality parameters in traditional systems of herbal
medicine. We have to provide better processing and storage facilities to improve the market of herbs and plants of the medicinal use.

We have to lay more emphasis on a market-responsive production system in order to sustain cultivation of medicinal plants and come forward to conserve our environment and livelihoods. In this production system we have to focus and maintain international standards and environment friendly procedure and a standard *marketing mix* by the manufacturer and marketer of medicinal plant-based herbal products: e.g., Product – green, organic, Price competitive, place-appropriate distribution channels, a time and cost efficient value chain, promotion-awareness across the chain, i.e. from producer to consumer, and Packaging -attractive, eco- friendly, eco- labeling, fair trade labeling. Therefore, delving out appropriate devices is a major challenge in managing medicinal plants resources, regardless of whether marketing (in other word ‘utilization’) and conservation co-exist through a livelihood-enabled production system.

**Research purpose**

After undergoing the study we are well aware of the nature and complexity of the problem and associated challenges in promoting and managing medicinal plant resources, the research focused on the environment, livelihoods, primary healthcare, market, and institutions in order to comprehend the glaring issues of the medicinal plant sub-sector. Therefore, with a view to the aforesaid context and perceived problems and challenges, the purpose of this research is:

To evolve and develop a new strategic document mainly for the promotion of herbs and medicinal plants amongst the communities and to examine the implications of the conservation of the medicinal plants and their production and fulfilling the requirement of undamaged environment by human use, livelihoods, and primary health care and to help justifying the significance of a participatory approach towards the management and marketing that can be more reliable, efficient, effective help in management strategy and value chain for the medicinal plant industry. It may also help in promoting the herbs and the medicinal plants mainly as an economic activity.

It will also give a fair idea of the economic linkages / economic viability for the
herb and medicinal plant growers, by the result the farming of herbs and medicinal plants will become the main focus because of its increased demand and acceptability on the basis of its potential for the economic generation.

Economic activities such as agriculture cattle ranching, fuel wood gathering, commercial logging, and infrastructure development are perceived as direct cause of damage caused to herbs, shrubs, climbers and plants of medicinal use.

**Social factors**: (e.g. culture, values, traditional practices and property rights) influence people’s interaction with forests, their access to forests and their valuation of forests.

**Economic factors**: (e.g. the market, incentives and trade) influence the production of forest goods and services, the role of the forest sector mainly herbs and medicinal plants, in the national economy and the distribution of income resulting from forest activities.

**Political factors**: (e.g. the political system and the political process of decision making government ownership of natural resources and public policies) affect the degree of intervention in the pricing and extraction of forest products, the extension of favorable treatment to interest groups, and the selective provision of forest output as public goods.

**External factors**: (e.g. the demand in foreign countries for our local herbal resources and products) also influence economic and political considerations in forest use.
OBJECTIVES OF THE STUDY

1. (a) To study the key issues, role of community and local level institutions in herbs, medicinal plant management / governance.

   (b) To study the impact of the different management systems, on the Natural resources with specific focus on Traditional and new socio-economic needs with special reference to herbs and medicinal plants.

2. To suggest measures for sustainable use and management of medicinal plants and herbs on the basis of the study and to create an eco-friendly, and better socio-economic environment in the community.

3. To link medicinal plants and herbs with present health and medicinal requirements, medicinal and socio-economic system for the promotion of medicinal plants and herbs, and develop linkage between the market and producer in the area.
SITE DESCRIPTION
**Table 1**: District Udham Singh Nagar at a Glance

<table>
<thead>
<tr>
<th>S.No</th>
<th>Items</th>
<th>Statistics</th>
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<tbody>
<tr>
<td>1</td>
<td>GENERAL INFORMATION</td>
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<tr>
<td></td>
<td>(i) Geographical Area (Sq km)</td>
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<tr>
<td></td>
<td>(ii) Number of Tehsils / Blocks</td>
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<td></td>
<td>(iii) Number of villages</td>
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<td></td>
<td>(iv) Population (as on 2001 census)</td>
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<td></td>
<td>(v) Average Annual Rainfall (mm)</td>
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<td>GEOMORPHOLOGY</td>
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<td></td>
<td>(i) Major Physiographic units</td>
<td>Bhabar and Tarai</td>
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<td></td>
<td>(ii) Major Drainages</td>
<td>Sarada, Kosi, Gola and Phikka</td>
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<td></td>
<td></td>
<td>and their tributaries are</td>
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<td></td>
<td>Sawaldeh, Bour, Nandhour,</td>
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<td>Bhak, Kailash etc</td>
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<td>(iii) Cultivable Area</td>
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<td>MAJOR SOIL TYPES</td>
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<tr>
<td></td>
<td>Bhabar : Boulder, Sand and Clay</td>
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<tr>
<td></td>
<td>Tarai : Sand, Clay and Silt</td>
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<td>Population in different Blocks</td>
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<td>Description</td>
<td>Value</td>
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<tr>
<td></td>
<td><strong>Female Population</strong></td>
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<td><strong>Literacy Rate</strong></td>
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<td><strong>Rainfall</strong></td>
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<td><strong>Number of Micro Watersheds</strong></td>
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<td><strong>Marginal Workers</strong></td>
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<td><strong>Total Workers</strong></td>
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<td><strong>Work Participation Rate</strong></td>
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<td><strong>Casual Labour</strong></td>
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<td><strong>Agriculture Labour</strong></td>
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<td><strong>Household Activities</strong></td>
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<td><strong>Other Work</strong></td>
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<td><strong>Number of Self Help Groups</strong></td>
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<tr>
<td></td>
<td><strong>Coverage Members</strong></td>
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<tr>
<td></td>
<td><strong>Total Number of Swaraoj-garies</strong></td>
<td>516</td>
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DISTRICT UDHAM SINGH NAGAR OF UTTARANCHAL

In the vicinity of the spectacular Kumaon lies the district of Udham Singh Nagar, which was a part of district Nainital before it gained the identity of a separate district in October 1995. The district was named in memory of Late Shri Udham Singh who was a great freedom fighter and who killed General Dyre after the brutal Jalianwala Bagh massacre. The district comprises three main sub divisions - Rudrapur, Kashipur and Khatima, and is surrounded by the exotic Himalayan ranges. The district is situated at 28˚ south east, 30˚ north latitude, 78˚ and 81˚ east longitude of Kumaon. Nainital is to the north, Bijnour, Moradabad, Rampur to west, Bareilly and Pilibhit to south and district Champawat is in the east. Reserved forest area lies at the borders of district Nainital and Champawat. The total district is Tarai. Water is available at the depth of 10 to 20 meters. In this region Phanerophytes dominate the biological spectrum, followed by Therophytes. The foot hill region of Kumaon includes unique physiographic ecosystem as bhabar and tarai. In contrast to Bhabar, the Tarai region is water logged alluvial plain with gentle south-east slope. The study area enjoys typical monsoon climate with rich humidity during July to mid of September, nearly 70% rainfalls during July to September. The District is inhabited by two major tribal communities’ viz. Tharus and Bhoxas. This region is characterized now with settlement of human beings of different culture from eastern Uttar Pradesh, Bihar, West Bengal, adjacent Nepal and war refugees besides the Kumauni Migrants from District Nainital, Pithoragarh, Almora and Bageshwar prominently and people from other distant places with different class & gender are settled in Udham Singh Nagar. The Tharu tribe living in Udham Singh Nagar is the largest primitive tribe of the Uttarakhand; they prefer living in the forest or in the fringes as they sustain a close association with the nature.

Due to its special geographical features, the district is a leader in agriculture in the country. The total area of the district is 3055 sq km. It has an altitude of 550 m. There are seven blocks namely Jaspur, Kashipur, Bajpur, Gadarpur, Rudrapur, Khatima, and Sitarganj in the district. It has 27 Nyaya Panchayats, 8 Palika Parishad, and 7 Nagar Panchayats. The total number of villages in the district is 656. The main languages spoken in the district are Punjabi, Hindi and English. All the villages are electrified in this district.
There are numerous places of interest in the district. According to historians, hundreds of years ago village Rudrapur was established by a devotee of lord Rudra or by a Hindu tribal chief called Rudra. The area has passed through many phases of development to take the shape of Rudrapur. The importance of Rudrapur has increased as it is the head quarters of district Udham Singh Nagar. During the reign of the Mughal emperor Akbar this land was handed over to King Rudra Chandra in 1588. The king established a permanent military camp to free the tarai from regular invasions. Thereafter village Rudrapur was filled with new colours and human activities. At a distance of 2 Kms from the bus stand and half a kilometer away from the Rudrapur-Haldwani motor route, the famous temple of Atariya is situated. Every year during the occasion on 'Navratras' a large fair is held here and thousands of devotees come to seek the blessings of Goddess Atariya. Kashipur was known as Govishan during the time of Harsha (606-647 AD), when Yuan-Chwang (631-641AD) visited this region. The ruins of the large settlement of those days are still to be seen near the city.

Govind Ballabh Pant University of Agriculture and Technology (GBPUAT) is one of the finest temples of learning around the world. This university has made a huge contribution to human resource development with its stress on horticulture, agriculture management, animal husbandry. A degree college is being established at Bharsar in Pauri so that horticulture can be used as a medium for development in the State. This place has rare places for sight seeing since it is surrounded by Kumaon Himalayas on one side and Nepal on the other (Tanakpur touches the Khatima border which is in Champawat district). Nanak Matta dam, Dronasagar and many other places are worth visiting. Atariya mandir mela and Chaiti mandir mela are famous and one can find local folk activities and mingle with local culture and traditions.