Forests purify our air, pressure water sheds and improve water quality and Quantity, stabilize soil and prevent erosion. Trees are provide us with natural resources such as timber products and medicinal plants, and are home to many of the world’s most endangered wild life species. In additions, an estimated 1.6 million people world wide relies on forests for their lively hoods, with 60 million indigenous people depending on forests for their subsistence.

Another critically important function of forests increasingly and widely acknowledged now is that they help to protect the planet from climate change by absorbing carbon dioxide (CO₂), a major green house gas (Loucks, 1993).

An attempt has been made in this chapter to understand the importance of forest around Jhalana Hills at Jaipur city and to identify the mitigation strategies to reduce deforestation and pollution around the Jhalana Hills. In this connection, various tree, bush, shrub, creeper and grass species were collected from Jhalana hills and they were compared and identified with the voucher specimens of Herbarium, Department of Botany, University of Rajasthan, Jaipur (RUBL). Maximum number of plant species was recorded during rainy season and minimum in winter and summer seasons (Tables. 4.1). There was little difference in the
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number of plant species present at different sites on the protected and unprotected hills during rainy season.

Environmental problems

Rainfall is the chief source of soil water. The water available to plants and animals from soils comes as a result of rainfall. There occurs an interchange of water the earth’s surface and atmosphere, forming the water or hydrologic cycle, so at present due to degradation of flora annually rain falls are decreasing and earth temperature will be increasing due to global warming. Gradual rise in atmospheric and ground surface air temperature and consequence change in global radiation balance caused mainly by anthropogenic process leading to climatic changes at different levels (e.g. local, regional and global). It has been estimated that the overall increase in the surface air temperature over the past one hundred years has been about 0.5°C to 0.7°C (Pandey, 2005).

Changes due to climate change (temperature and precipitation) are expected to be relatively well buffered by the mineral composition, the organic matter content or the structural stability of many soils. However, decreases in cover by vegetation or annual or perennial crops, caused by any locally major declines in rainfall not compensated by CO₂ effects, could lead to soil structure degradation and decreased porosity, as well as increased runoff and erosion on sloping sites and by the concomitant more extensive and raid sedimentation. Changes in options available to land users because of climate change may have similar effects. In certain fragile soils, the nature of the dominant soil-forming process may change for the worse with increased, decreased or more strongly seasonal rainfall (Kar, 2009).
Due to deforestation, a number of Environmental problems occur, these have far reaching consequences. The adverse impact of deforestation on rain fall pattern is a controversial issue. In the great Aravalli Jhalana Hills regain at Jaipur City the decreasing levels of rain alls and rainy days is closely related to deforestation. The increasing rate of soil erosion due to deforestation is another well established phenomenon. The great Jhalana Hills regain is very prone to erosion under normal conditions, because of degraded oldest mountain of the world. While forest cover prevents top soil from direct rainfall, wind and heat, its root system with holds the soil particle together. It is estimated that nearly 100 sq. km. of area is vulnerable to erosion and deforestation has aggravated the problem. Deforestation also affects the ground water conditions (Sharma and Singh, 1989).

Vegetation cover regulates the surface runoff by holding a certain amount of water in the soil particles around the root systems. This water then gradually seeps down during the dry period. Once the forest is cleared, the entire process is hampered. Rock out crops due to soil erosions occur frequently on the slopes and premature terraces have been formed by salutation reservoir. The Jhalana hills region has undergone slow degradation. Deforestation because of the wide spread felling of the trees due to biotic interference, mining, industrialisation climatic changes and other direct or indirect factors. In the changes the degree of deforestation is vary drastic in forest reserve areas on hilly regain. Up to 1970s the Jhalana hills had dense forests and higher density of tree cover
in the vast tracks of higher hills and deep valleys. However, massive felling of trees, caused by the greed of human beings and increasing demand for timber, fuel, fodder etc. has caused severe strain on the Eco-system (Lewis et al., 2009).  

**Deforestation in Jhalana Hills Region of Jaipur**

Different types of plants species are cut down due to the establishment of urbanization. Trees are invaluable property of a nation because they provide raw materials to modern industries and for building purpose including habitat for numerous types of animals and micro organism. They also provide friable and nutrient rich soils having organic matter (Shetty and Singh, 1987).

Destruction of cover and the under growth is called a forestation. Rapid rate of industrialization, urbanization, agricultural development and above all population growth have great pressure on the use of land, water and vegetation resulting into degradation of level trees resources and consequent accelerated rate of soil erosion degradation of surface water, both rivers and lakes, discharges of immense volume of untreated polluted sewage and effluents coming out of industrial installation and urban, centres into our rivers, acute air pollutions in the urban agglomeration since 1950 (Anonymous, 1987).
Causes of Deforestation:

The combined influence of economic pressure, Population explosion, cattle populations and government policies have together precipitated the present alarming situation. Most part of the Rajasthan has been explored by various Ethan botanists, Ecologist and Environmentalist for different purposes. Frequent surveys are also conducted by the department of forest for protection and growing of new forest. The tree encourages and increases infiltration of soil water and thus allows maximum recharge of ground water resources trees are natural “sink of CO\textsubscript{2}”. They use CO\textsubscript{2} to prepare their food during the process of photosynthesis. Trees provide firewood to millions of people all over the world. The property and welfare of the society directly depends on sound and healthy forest cover of a nation concerned. Trees are main component of the biotic component of the natural environmental system and the stability of the environment and ecological balance. Largely depends as the status of the forests of the region concerned (Snatapau, 1953).

Due to a forestation rocks are formed around the Jhalana Hills. Different types of climate changes occur due to the cutting of trees species. The temperature is increasing due to absorption of sun radiation directly by the rocks. So re-plantation and protection has become an urgent need to fulfil the shortage of flora present.
Another critically important function of forests increasingly and widely acknowledged now is that they help to protect the planet from climate change by absorbing carbon dioxide (CO$_2$), a major greenhouse gas (Loucks, 1993).

**Ethnomedicinal Plants of Jhalana Hills**

The ethno botanical works in organized way were started by Botanical Survey of India in 1969. Since then uses of plants by the tribal are being recorded for a variety of purposes (Jain, 1981). Considerable notable work has been done on several aspects of plants viz. ethnomedicine, dyes, tans, narcotics, fibre, timber etc, Bhandari (1974), Jain (1981), Singh and Pandey (1981), Sebastian and Bhandari (1984), Katewa and Guria (1997), Nargas and Trivedi (1999).

The tribal depend on the plants around them which made them acquire knowledge of economic and medicinal properties of many plants by trial and error. Consequently they became the storehouse of knowledge of many useful as well as harmful plants accumulated and enriched through generations and passed on from generation to another without any written documents, It is therefore important to study ethno botany and it must be properly documented and preserved urgently because most the tribal are being assimilated into modern societies and
the treasure of knowledge of uses of plants resources is fast disappearing (Conklin, 1962).

The observations emanating from the present survey need to be substantiated with pharmaco-chemical studies in order to evaluate their effectiveness. However, for some species, there is evidence in the literature that the mode of application being practiced by the local people is likely to be effective.

The study has a great academic significance as far as the tissue culture studies of the ethnobotanically important plants especially having high medicinal value are concerned. Suitable experiments can be designed in this respect in order to understand the physiology of growth on one hand and various physical and chemical factors involved during the process of growth and differentiation on the other hand. Plant growth and differentiation are important developmental phenomenon and nutrients and growth regulators play significant role in its control. Such efforts are indeed necessary for successful commercial metabolites for medicinal and pharmaceutical purposes and may open alternative sources overcoming the present threat of biodiversity.

The tribal people and ethnic groups throughout the world have developed their own culture, customs, religious rites, taboos, totems,
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legends and myths, folklores and songs, food, medicinal practices etc. Numerous wild and cultivated plants play a very important and vital role among these cultures and this interrelationship has evolved over generations of experience and practices.

There is evidence of the fact that many valuable drugs of our modern medicine have been discovered by knowing that a particular plant was used by the ancient folk healers in one or more of the ancient cultures of world for the treatment of some kinds of ailments. Also a particular plant which has been in used by traditional healers since antiquity for one ailment may be of considerable value in other ailments too. There is enough scope of the amalgamation of these drugs in the mainstream of prenatal medicinal systems today after the tribal drugs are subjected to the photochemical and biological screening together with clinical trials.

The practice of indigenous traditional knowledge and its application are still alive in different tribal colonies of study area. So we have to make strong efforts to save this splendid knowledge for our next generation. Before they are lost forever from the community. The plants used in magico-religious beliefs, in rites and rituals including those in diseases, divination and worship by different tribal societies of National
and International have been discussed by many scientists (Swarnkar and Katewa, 2008; Nath and Khatri, 2010; Mesfin et al., 2013; Mahmoud and Gairola, 2013; Meena et al., 2014).

Most of these tribal groups do not have modern health facilities. Generally they use their traditional knowledge of the locally available plants for medicinal and other purpose. Due to lake of interest of the young generation among the tribal’s in traditional knowledge and due to urbanization and unscientific exploitation of natural forests. The valuable traditional knowledge and plant species are depleting very fast. Therefore it is necessary to collect and document such precious knowledge from the tribal areas as soon as possible and also increase awareness among the tribal communities for the conservation and sustainable use of plant wealth. The present study listed total 30 species belonging 24 families used for the treatment of various disease by tribal’s of Jhalana Area, Jaipur (Rajasthan).

The observations and findings made under present investigation reveals that the ethnic groups and local people of the area are highly dependent on the natural plant resources surrounding their vicinity and these resources play an important role in their routine life. It is the need
of the hour to focus immediate attention for the plant conservation from the government and NGOs with the help of local people by creating rapid awareness in them. There is need of cooperation and coordination among various agencies such as forest and the pharmaceutical firm interested in the utilization of these medicinal plants and to initiate restoration work in affected areas. By doing so we can change the economic and social conditions of the local inhabitants positively.

**Air Environment**

Pollution is one aspect of the environmental changes, which can be induced by man. Air pollutants are being released continually into the environment, which affect the composition and functioning of the ecosystem. Air pollution from motor vehicle exhaust has become a major cause of public concern worldwide. In Jaipur, traffic-related air pollution is a serious problem owing to exponential growth in the number of automobiles. Prevalence of aged vehicles along with poor maintenance of automobiles and inadequate emission control measures (Agarwal and Agarwal, 2000). Air pollution is caused due to both add to the problem gaseous (Oxides of nitrogen, oxides of sulfur, oxides of carbon etc) and particulate pollutants (organic and inorganic). Industrialization and
urbanization are the two major causes of deteriorating air quality (Vijayanand et. al., 2008).

Atmospheric aerosols have been receiving increased attention from investigators engaged in air pollution and environmental hygiene studies. Size and chemical compositions are among the most important parameters influencing the way in which air borne particles interact with the environment. Air borne heavy metals are mainly bound to particulate matter and only a small fraction (<5%) is observed in vapour phase (Soni and Agarwal, 1997).

Rajasthan is famous for its marble deposits. Rajasthan alone produces 95% of the total marble produce of the country. Marble reserves in India are estimated at twelve hundred million tones and Rajasthan has more than eleven hundred million tones of reserves. There are around 4000 marble mines and about 1100 marble cutting units in the medium sectors, spread over the 16 districts of Rajasthan. The cutting units produce huge quantities of marble slurry every year, and the disposal of this slurry is a big problem for the marble cutting units. It is being dumped in open land, and causes environmental and health problems in the areas of disposal (Tripathi and Misra, 2012). Marble mining at Makrana and other areas is a classic example of unscientific
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mining and improper waste disposal. The marble slurry imposes serious threats to the ecosystem, physical, chemical and biological components of the environment. Emissions from industrial establishments are one of the major sources of environmental pollution. Several organization have been involved in exploring the use of marble slurry as a construction material namely MNIT, IIT Roorkee, University of Wisconsin, CBRI, TIFAC, some universities in Turkey, IST Portugal, CSIR and many others.

A study have been undertaken at MNIT Jaipur, CRRI, New Delhi and some other institutions to improve the properties of soil by the addition of marble dust in various proportions. There has been substantial improvement reported in engineering properties of soil and CBR values. The above studies indicated that marble dust has a potential for use in road works and bridge approaches. Binicil et al. 2007 found that Marble dust concretes had higher compressive strength than that of the corresponding lime stone dust and control concrete with equivalent WIC and mix proportion; the results indicate that the marble dust concrete would probably have lower water permeability than the lime stone and control concrete.
The study area is famous for its marble deposits. Marble processing, Solid waste generation and its disposal, trading and transport of marble blocks, slabs and irregular marble pieces and art and craft work are important activities in Jhalana Hills. The data revealed that marble units create much air pollution during transportation, material handling etc. It also affected visibility, respiration and other human activities.

The growth of dust pollution due to intensification of industrial enterprises and urbanization is not new which has economic and scientific implications of global climate concern (Ackerman and Stanton, 2011). In the present study detailed data of ambient air quality and meteorological conditions are shown in table.

Semi-quantitative evaluation of the early urban air pollution has in various ways, i.a. via records of material damage and impacts on human health and vegetation. Also simplified dispersion modeling is a possibility, when the consumption of flues and raw materials within a confined area are reasonably well known (Brimblecombe, 1987). Some direct measurements of air pollutants were carried out by scientists and amateur enthusiasts in the last century, but systematic and official investigations with continuous, time series of fairly recent date. In England the number of measuring sites was thus not increased
substantially before the London smog disaster in 1952 was not followed by the clean Air Act in 1956 (Brimblecombe, 1998).

In most of the industrialized world urban air pollution is now monitored routinely. Since 1974 WHO and UNEP have, within the "Global Environment Monitoring system collaborated on a project to monitor urban air quality, the so-called GEMS/AIR (UNEP, 1991; WHO/UNEP, 1992; GEMS/AIR, 1996; and a series of related reports). Concentrations of air pollutants in selected countries also reported yearly by the OECD (1997). A comprehensive presentation of urban air pollution in Europe, based on data from 79 cities in 32 countries (Richter and Williams, 1998) has recently been published by the European Environment Agency. These data and similar ones give an indication of trends in ambient air quality at national level and in cities. However, one should be cautious when comparing absolute values from different regions. Often the data are based on one or a few monitoring stations, placed at critical sites and thus represent micro-environments. It should also be taken into account that the coverage of station is different for countries (Larssen and Hagen, 1997) and that average values can therefore differently biased.
Natani (2003) studied geological and environmental status of makrana marble mining area at Nagaur district in Rajasthan and reported that increase in spread of mining area, waste dumps and built up land is at the expense of agricultural land, open lands, ponds and pasture land over last 20-30 years and slurry disposal is done on contract based due to which contraction dispose the marble slurry in open lands, agricultural land, ponds and even on road side and concluded that mining has appreciable adverse impact on human settlements. Air pollutants that are inhaled affect human health severely in ways of damaging the lungs and respiratory system. Particular matter (PM) in urban areas is mainly made up of metals, organic compounds, material of biological origin, secondary particulate matter (Some-time even in ionic from) and pure or elemental carbon (Pandy et al., 2001).

Many organic compounds can lead to mutations and can be cancerous. A major fraction of diesel particle are smaller than 1µm in diameter. They consist of a carbonaceous core with large surface area on which many organic compounds like carcinogenic Polycyclic and nitropolycyclic hydrocarbon are adsorbed. A recent study by the United State Environmental Protection Agency has linked diesel emissions with high cancer risks (US-EPA, 2002). Air pollution leads to several adverse health effects such as acute respiratory infection, bronchitis, asthma,
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cardio-vascular disease and lung cancer. Long-term exposure to them may even lead to nervous system disorders (Grant, 2009). Vehicular emissions, in particular, are estimated to account for 60-70% of total air pollution (CPCB, 2004). Pandy et al., (2005) studies health risks of NO₂, SPM and SO₂ in Delhi (India) and reported that health risks due to air pollution in Delhi were highest for children and for all age categories, health risks due to SO₂ were lowest. Health risks for NO₂ and SPM were reported 22.11 and 16.13 times respectively more than that due to SO₂ and concluded that the effects of air pollution on health are very complex. Similar conclusions have also been drawn by several epidemiological studies carried out in other part of the world (Neuberger et al., 2004; Cerna et. al., 1998).

In the present study sampling was carried out at 5 stations within 2 km radius. Ambient Air quality monitoring was conducted in Jhalana Hills and the Surrounding area. Major air pollutants are suspended particulate matter (SPM), Sulphur dioxide (SO₂), Nitrogen dioxide (NO₂) and RSPM which represent the basic air pollutants in the region were identified for air quality monitoring. Out of total 7 sites monitored, the maximum range of RSPM was found in Chandpole i.e. 134.52 µg/m³ and minimum level of RSPM were recorded in Rajasthan University i.e. 52.66 µg/m³ while maximum level of TSPM were recorded in Jhalana
Industrial Area i.e 438.68 µg/m³ and minimum level of TSPM were also noted in Rajasthan University 136.32 µg/m³. Similar findings were reported by Prajapati and Tripathi (2008) who evaluated the Air pollution tolerance index (APTI) of many plant species in Varanasi City and RSPM and TSPM in the city was recorded 174 µg/m³ and 345 µg/m³ respectively. Similarly a study of suspended particulate SPM had been performed by Goyal (2002) in Delhi who report that SPM concentration reached the highest (465.68 mg/m³) in November and the lowest (150.07 µg/m³) in August. Air particulate samples collected at a background site situated on the east coast of Thar desert in Rajasthan state of India were analyzed for atmospheric dust loads (SPM) and elemental composition. The values of SPM ranged from 9 mg/m³ to 97 mg/m³ with an average of 43 mg/m³ except a few episodic values, which were 3 to 5 times higher than the average during summer months (Negi et al., 2005).

Presence of trees in the urban environment can improve air quality through enhancing the uptake of pollutant gases and particles (McPherson et. al., 1994; Beckett et al., 1998; Freersmith et al., 1997). Zareeena et. al., (2007) carried out a detailed survey of air quality at important junctions in Bellary City to study the ambient air quality. It was found that the level of respirable particulate matter (RSPM) and suspended particulate matter (SAM) exceeded the ambient air quality
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standard of central pollution control board. The concentration of RSPM varied from 52.66 µg/m3 to 134.52 µg/m3 whereas TSPM varied between 136.32 µg/m3 to 438.68 µg/m3. Due to combustion of coal petroleum, refining crude oil, use of motor vehicles, combustion of wood, forest fires, burning of coal refuse and agricultural waste, various types of pollutants are released in the air, chief among them are dusts, suspended particulate matter (SPM) and gases causing injuries to human or animal life, vegetation and property (Brasseur, 1991; Pope et al., 1995; Kimani, 2007; Jimoda, 2012).

Suspended Particles are always present in the atmospheric air in the form of finely divided solids or liquids of different sizes, large sizes dust and small sized particles. Sometime small Particles may coagulate to large particles which may result in fallout or dust fall, bringing severe health consequences in human population in several ways such as bronchitis, other respiratory problems, lung damage and death (WHO, 1997).

Roy et al., (2012) studied the effects of dust and suspended particulate matter on some hematological characters of the human population of Katras- Dhanbad coal field area and observed that suspended particulate matter occurred in different quantities such as 689
µg/m³, 451.7 µg/m³ and 241 µg/m³ as mean average weight during winter, summer and rainy season of 1988-1990. Such variation in concentration of SPM has been reported by several research workers (WHO 1997 and Trivedi, 1998). Particulate matter shows variation in chemical composition, size of the particles and their distribution as shown by earlier workers (Mitchell and Carell, 1989 and Romien et al., 1990). Oxides of sulfur can oxidize and form sulfuric acid, thereby leading to the damage of lungs and various lung disorders such as wheezing and shortness of breath, oxides of nitrogen, on the other hand, can in particular make children susceptible to respiratory diseases especially in winters. When exposure to these oxides gets combined with the exposure to suspended particulate matter (SPM), the long term effects are quite difficult to ascertain. The main chemical component of SPM that is of major concern is lead, others are nickel, Arsenic and those present in diesel exhaust. When we breathe, these particles damage our lung tissues and cause various respiratory problems. In short air pollution affects not only human health but also ecological health of a region (Okita et al., 1996; Pandy et. al., 2002, 2004; Srivastava et al., 2005).

Air born particulate matter is a mixture of many chemical species (pollutants) in solid and liquid forms. Depending on whether they are emitted directly by emission sources or are formed because of
atmospheric reaction of various gases, PMs are, respectively, classified as primary or secondary particulate matters. For instance, reaction between ammonia and oxides of nitrogen or sulfur may lead to the formation of secondary particulate matter. The particle size for PM can vary from 0.005 (0.005x10^{-6} m) to 100 \( \mu \)m in diameter. All ambient PM irrespective of size is referred to as SPM, Particulate Matter less than 10 mm in diameter is referred to as PM\(_{10}\) and PM less than 2.5 \( \mu \)m is referred to as PM\(_{2.5}\) (Pandy et al., 2005).

Particulate Matter (PM) is not a well-defined entity as, e.g., carbon monoxide. Originally it was determined as soot or 'black smoke' for which there is an EC air quality limit value (Edwards, 1998). Later the concept of Total Suspended particulate Matter (TSPM) was introduced by measurements of PM\(_{10}\) (Particles with diameter less than 10um). Unfortunately the major part of PM\(_{10}\) may have a natural origin (e.g., Sea spray or desert and Soil Dust), and therefore it is important also to measure PM\(_{2.5}\) or even when the appropriate technology has been developed, PM\(_{1}\). Various types of health impacts of the major air pollutants are well established (WHO, 2000), but a series of, notably organic, Compounds are not sufficiently investigated. In recent years numerous epidemiological studies of short and long-term effects of air pollution have shown that fine particles at the present levels are
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Responsible for significant impacts, especially on people suffering from respiratory and cardiopulmonary diseases (Pope et al., 1995). Thus Schwartz et al. (1997) have reported a 10ugm⁻³ increase in total daily morality, although the actual mechanisms are still not known.

Air born studies with particulates have been conducted and reviewed by several workers (Clements et al., 2012; Chen et al., 2011; Brook et al., 2010). However the most important characteristic of air born particulate Matter is the particle size and the velocity at which particles fall as a result of the aerodynamic behavior in the earth's gravitational field.

Thus atmospheric particulate matter is often very complex. Individual particles may be composed of different chemical species, can be homogenous or heterogeneous in structure and may vary in size and shape. Sulphur dioxide (SO₂) is the classical air pollutant associated with sulphur in fossil fuels. The emission can be successfully reduced using fuels with low sulphur content e.g. natural gas or oil instead of coal. On large plants in industrialized countries desulphurisation of the flue gas is an established technique.

Nitrogen oxides are formed by oxidation of atmospheric nitrogen during combustion. The main part, especially from cars, is emitted in the
form of the non-toxic nitric oxide (NO), which is subsequently oxidized in the atmosphere to the secondary 'real' pollutant NO2. The emissions can be reduced by optimization of the combustion process (Low NOx burners in power plants and lean burn motors in motor vehicles) or by means of catalytic converters in the exhaust. Due (1998) reported that in Ho Chi Minh City in Vietnam the air quality has been deteriorating i.a. due to the increasing vehicular traffic, Daily overage values of NO2 are between 50 and 250 ug/m3 with hurly peaks, which can due to exceed 700 ug/m3. In a series of major cities, where energy Production is based on gas or low sulphur coal (eg. Bombay, Calcutta, Bangkok) SO2 with average levels about 30 µg/m3 is not a serious problem. In many cases, however TSPM levels are above WHO guidelines (WHO / UNEP, 1992). The capital of Japan, Tokyo, is an encouraging example of an industrial mega city, where air pollution is controlled. In the 1960s it was heavily polluted due to coal combustion and insufficient emission control. Concentrations peaked in the late 1960s with annual mean value µg/m3 (Komeiji et al., 1990).

In the present study the maximum level of SO2, NOx were recorded in Jhalana Industrial Area and Chandpole i.e. 21.34, 40.52 and 21.27, 34.24 µg/m3 respectively whereas minimum level of SO2 and NOx were recorded in Rajasthan University and Bapu Nagar i.e. 7.74, 11.58 and
13.89, 21.89 µg/m³ respectively. Similarly Mahesh et. al., (2001) reported impact of Amusement park at metagalli Residential-Industrial area in Mysore City on air environment and the result revealed that the average base line values for NOx and SO₂ were in the range of 29.61 µg/m³ and 32.13 µg/m³ respectively.

Similarly Goyal and Siddhartha, (2002) conducted study in Delhi to monitor effect of winds on SO2 and reported that the monthly mean concentrations were in the range of 16.15 to 34.44 mg/m³ and showed regular seasonal variations within the highest concentrations in winter and lowest in the monsoon season. Similarly findings were reported by Wong, et al., (2008) who studies the effects of Air pollution on mortality in socially deprived urban areas in Hong Kong, China. The air pollution tolerance Index (APTI) of many plant species had been evaluated by Prajapati and Tripathi (2008) in Varanasi City. The concentrations of SO₂ and NO₂ were recorded 149.8 ug/m³ and 184 ug/m³ respectively and it was concluded that the concentrations of these pollutants exceeded the limit prescribed by CPCB.

A comprehensive, spatially resolved (1.25°, 0.25°) fossil fuel consumption database and emission inventory was constructed for India. Emissions of Sulphur dioxide and aerosol chemical constituents were
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estimated for and extrapolated to the Indian Ocean Experiment (INDOEX) study period. Emission factors for various pollutants were derived using India specific fuel level characteristics and information on combustion / air pollution control technologies for the power and industrial sectors (Reddy and Chandra, 2002). Sing and Tiwary (2002) conducted an experiment with *Phaseolus mungo var. Radiatus linn.* (variety Jerman-9) to study the effect of sulphur dioxide on total free amino acids, proteins and growth parameters. Treatments were given to 20- day old plants for 30 days. Results were noted for 35, 50, 65 —day old plants. The results revealed that growth parameters, total free amino acids and proteins were found to be adversely affected under SO2 exposure of 1.00 ppm. Dry deposition of nitrate on marble was measured at Dayalbagh in a semi- arid region on India in the winter season by Kumar et al., (2001). It was observed that the dry deposition rate of nitrate was 2.1+1.3mg/m²/d with corresponding ambient concentrations of HNO₃ vapour and particulate NO₃ of 0.84±0.4814/m³ and 7.9±1.8mg/m³ respectively.

Ruj, B and Bhaumik (2001) conducted study on some gaseous pollutants in Durgapur (W.B), an industrial City of India. Ambient air was monitored for a period of one year (1992) with respect to sulphur dioxide and nitrogen dioxide at three sites. It was observed from the
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study that concentration levels was lower from the month of July to October and higher from the month of December to June at all the three sites. Out of 12 months average value of NO₂ at the three sites was recorded maximum 74 ug/m³ (June) at Gopalnath and minimum 28 ug/m³ (October) near DSP hospital whereas average value of SO₂ was recorded maximum 20.4 ug/m³ (January) and minimum 3.1 µg/m³ (September) at Gopalnath. Economic liberalization coupled with rapid industrialisation is changing the conditions of developing nations. Laxity in regulation and implementation of environmental laws is augmenting pollutant loads. Negative impacts of these can be seen on the growth of vegetation and trees. Thus the results of air quality data and analysis of air samples of present study revealed that the concentration of parameters viz. RSPM, TSPM, NOx and SO₂ were slightly exceeding the prescribed limits by Central Pollution Control Board (CPCB).

**Noise Pollution**

Noise pollution in commercial area is a serious health hazard. Noise is an unwanted sound with a random intensity, a signal that bears no information. The normal human exposure can vary from the minimum that the ear can perceive, i.e. 0-dB to loudest. For comfortable hearing one needs sound at a level of 55 db or less (Bhattacharya, 1996). The
public appear to be equally concerned about the noise, besides quality of air and water. The man-made activities are responsible for the increase in the ambient noise levels particularly in the urban area. A number of studies are available on noise pollution from different part of India (Concha-Barrientos et al., 2004; Behzad et al., 2007; Agarwal and Swami, 2010; Essandoh and Armah, 2011) and the main course of high noise is attributed to vehicle and its hooting. As noise has various ill effects on the health of healthy man, the ailing and diseased person are more prone to deleterious effects of noise.

Mori and Murata (1979) reported that patients who are conscious for all time in operation theatre may become stressed because noise. The patients in the hospital need complete rest in stress free environment and the disturbance of patients due to noise affects their recovery. Minckley (1968) and Fife and Rappaport (1987) concluded that increase in noise level directly affect healing process. Similarly the medicare personnel in hospitals also need calm and congenial environment to treat the patients efficiently.

Aitken (1982) reported that the noise level of above 50 dB in every area of a modem hospital, caused increased sleep disturbance and increased use of analgesia. Due to excess noise, a two or four fold
increase of hypertension, nervous disorders, gastritis, gastric ulcers and disorders have been witnessed. Noise interferes with human activities such as sleep, speech communication and task requiring concentration. It may also cause annoyance, hearing damage and other physiological problems (Monsen, 2005).

The present Study dealt with the noise levels within 2 km radius in Jhalana Hills. Maximum noise level during day and night time was recorded in Jhalana area i.e. 78 leq dB (A) and 59 leq dB (A) respectively and minimum noise level during day and night time was observed in 50 leq dB (A) and 44 dB (A) respectively. In Malviya Industrial Area during day time, noise level was reported slight eh as compared to the standard prescribed by CPCB i.e. 75 leq dB (A) at day time and and therefore workers were suffering from hearing problems.

Similarly Atmaca et. al. (2005) studied the impact of industrial noise on humans around Sivas. Noise measurement and survey studies were carried out at concrete traverse, cement, iron and steel and textile factories located in this region. A questionnaire was completed by 256 workers during this study in order to determine the physical, physiological and psycho- social impacts of the noise on humans. It was concluded during the surveys, that the noise levels detected in all the
industries were much above the 80 leq dB (A) specified in the regulations. 73.83% of the workers in these industries were disturbed from the noise in their work places, 60.96% of them had complaints about their nervous situations and 30.96% of these workers were suffering from hearing problems.

Pandy and Shrivastave (2002) reported health effect of noise pollution in commercial areas with the help of questionnaire survey. The analysis of returned questionnaire revealed that the person in commercial area is forcing different types of health problems and persons above forty years of age were greatly affected due to noise pollution.

**Physicochemical Studies**

Soil is a dynamic system because of the presence of microorganisms and their biochemical activities liberating a lot of enzymes in (grouch become stabilized in soil by binding to soil components (Alexander, 1985). The soil salinity problem in the arid and semi-arid tract of western Rajasthan has attracted the attention since 1952 through a symposium organized on Rajputana desert by the then Indian institute of science. Through local and regional saline depressions are dotted throughout the western Rajasthan, the large tract in the southeast
of thar desert, namely Bilara- Sumerpur- Jalore triangle is one where natural soil salinity assumes unusual proportions (Metha et. al, 1969).

For good economy, Indian soil is being uncontrollably exposed to a variety of agro-chemical in order to increase crop yield, decrease crop infections and infestation, increase soil fertility etc. (Deshpande, 1996). On the other hand, any entry of foreign particle or polluting agent in the soil system results in alternation to the soil quality. The qualitative changes of soil start from the physico-chemical changes and further changes may be biological, Physiological, biochemical etc. (Kumbharkar and Dubey 2003).

The present study of soil quality for surface and deeper layers in Jhalana and surrounding area (within 2 km radius) were carried out and total 60 samples were collected. It was observed that the pH of surface soil was in between 7.10 (Rajasthan University) to 9.12 (Jhalana Industrial Area) indicating the alkaline nature of soil similarly the pH of deeper soil in all the selected area was in between 7.08 (Rajasthan University) to (9.12) (Jhalana Industrial Area). In study site due to marble pollution maximum increase in soil pH was observed in Jhalana Industrial Area at surface (9.12) as well as at deeper layer (8.88). Similarly findings were reported by Nawaz et al., (2006) who reported an
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increase in pH may be attributed to high calcium content of the marble effluent.

pH is a measure of acidity and alkalinity of soil-water suspension and provides a good identification of soil chemical nature. Increase in pH may be attributed to hydroxides of calcium (Ca (OH)$_2$) and aluminum [Al (OH)$_3$] formed during hydration process (Czaja, 1962). However, the pH of surface soil is higher than the deeper soil, which indicates that it is due to fall out industrial particulate matter. The findings of the present study are in accordance with results reported by Trivedi (2006).

In the present investigation, Electrical Conductivity of surface soil varied between 450 mho cm (Indra Nagar, Phase-2) to 3102 mho/cm (JLN Marg). In case of deeper soil, it was found in the range of 469 mho/cm (World Arboretum) to 2940 mho/cm (JLN Marg). The variation in EC from surface soil to deeper soil indicates good quality of ions and salts present in the soil. Acidic soil shows a definite tendency towards high EC, increased Ca, Mg, Fe, and Mn contents and decreased levels of organic Carbon (Gupta, 1999). The water holding capacity for surface and deeper soil was in the range 30.1% (Jawahar Nagar) to 44.25% (Rajasthan University) and 31.6% (Malviya Industrial Area) to 43.25% (Malviya Nagar) respectively. One of the important effects of soil is
change in the physico-chemical properties besides altering the microbial related processes (Tyler, 1981).

The Total Organic Carbon in the present study ranged between 0.2158 % (Jhalana industrial area) to 0.4855 % (World Arboretum) in the surface soil while it varied from 0.2015 % (Jhalana industrial area) to 0.4555 % (Rajasthan University) in the deeper soil. Slightly increase in total organic carbon indicates that the particulate matter and other incombustible matter may cascade and leachate on the soil which increase the organic content. Results of Water Holding Capacity and total organic carbon are slightly higher which affects the soil fertility of the study area. Similar results were obtained by Trivedi (2006). Moore and Russell (1972) reported higher organic carbon content in surface soil compared to the deeper layer and stated that organic matter in soil decline with increasing depths.

Vijaya and Reddy (1998) reported that restricted drainage of water in the high ground water table or low permeability is one of the major factors contributing towards salinity in western Maharashtra and bringing such soil under cultivation, is one of the major issues of concern.
Ground water is a gargle and important resource, it must be carefully managed to maintain its Purity. Groundwater plays an important role in agriculture, for both watering of crops and for irrigation of dry season crops. It is estimated that about 45 % of irrigation water requirement is met from ground water source. The intensive use of natural resources and the large production of wastes in modern society often pose a threat to ground water quality and have already resulted in many incidents of ground water contamination. Pollutants being added to the ground water system through human activities and natural processes.

Only 2.5 percent of all the water in the world is fresh water, the rest being sea water. 2/3 of this fresh water is found in polar ice caps, glaciers or is deep within the earth beyond our reach. Thus only less than one percent of all water is available to at potable water (Shiklomanov, 1998). The ground water table of each source comes down by the regular withdrawal of water hence the quality of ground water also gets deteriorated. In the last four decades the water table has receded by 20-30 feet (Garg et al., 1990 and Kaur et al., 1992). Consumption of sub soil water has exceeded the recharge rate thus increasing the fluoride content of the subsoil water to such a extent where it has crossed the safe limits. Therefore, it is a major health concern of our country, particularly in Rajasthan state.

Quality of water is an important factor in development and use of ground water as resources. The potable water should be free from pathogenic agents and chemical constituents, pleasant to taste and usable for domestic purposes. The ground water is characterized by multiple quality problems (Gupta, 2004). Many hazardous pollutants viz., Coloured dyes, heavy metals, nitrates and fluoride pollute it. Pandy (2002) has reported earlier that the marble slurry leads to deterioration of the ground water quality in Kishangarh.

In the present study, random sampling was carried out in and around 2 km radius from Jhalana Hills, Jaipur (Rajasthan). Total 18 samples from Jhalana Area and Total 136 water samples from surrounding area were collected and analysed for various water parameters like pH, TDS, EC, Alkalinity, Hardness, Chloride, Calcium, Magnesium and fluoride. The fluoride content in the ground water of study area ranged between 0.24 mg/l to 3.33 mg/l (Kookas). Mixed concentrations of fluoride were recorded around Jhalana Hills. Few of the areas were having fluoride within safe limit and others were beyond the permissible limit.
In another study, it was reported that 26.8% ground water samples had fluoride concentration in the range of 1.5 to 3 mg/L (or ppm) in southern parts of Jaipur district from east to west covering entire Chaksu block, most part of Sanganer, Phagi and Dudu blocks (Bhardwaj, 2003). Similar study was conducted in Shivdaspura Gram panchayat (Shivkumar, 2004), in Sitapura (Joshi, 2004), Padampura Gram panchayat (Jain, 2006), Phagi Tehsil of Jaipur district (Singh 2008) and Sujangarh Tehsil of Chum district (Jangid and Bhardwaj 2008). The result of present study approved the earlier finding. In the study area wells, tube wells and hand pumps are the chief sources of drinking water. The alkaline pH is a usual feature of productive water bodies (Kulshrestha et al, 2002 and Welch, 1952). pH value in the study area were found in the range of 6.98 (Rajasthan University) to 8.83 (Jhalana Industrial Area).

Acceptable range of pH as per guideline suggested by IS: 10500-1991 is 6.5- 8.5. In most of the ground water samples of the study area pH was observed within the Permissible limit. Botchway et al., (1996) stated that high fluoride concentration in ground water was probably due to low pH. In other studies it was reported that ground water contains fluoride rich alkaline water (WHO, 1970, Chandra et al., 1981 and Ashutosh et al., 2006).
The alkalinity in the water is due salts of carbonates, bicarbonates, nitrate, silicates and phosphates along with the hydroxyl ions in the Free State. In the present study alkalinity was reported minimum (85 mg/l as CaCO$_3$) in JLN Marg (Jaipur) and maximum (765 mg/l as CaCO$_3$) in Jagatpura.

In the study area alkalinity was minimum (140 mg/L as CaCO3) in road No.9F4 and fluoride concentration was within safe limit (0.82 mg/L) whereas hardness showed relatively high values (960 mg/L). Similarly within 5 to 10 km radius and 10 to 15 Km radius around Vishwakarma Industrial Area (VKIA) alkalinity showed optimal value (600 mg/L prescribed by IS-10500-91) i.e 320 mg/L and 430 mg/L respectively and fluoride concentration was found 0.98 mg/L and 2.15 mg/L respectively whereas hardness value ranged very high i.e. 1140 mg/L and 1304 mg/L respectively. Susheela (1999), Sinha and Musturia (2004) and Saini & Bhardwaj (2006) also reported that the increase in alkalinity showed positive correlation with fluoride.

Chlorophyll content was also determined by Arnon method (1949) and it was observed that in Azadirachta indica total chlorophyll content was maximum for Rajasthan University (2.66 mg/g) whereas minimum for JLN marg (1.36 mg/g). In Bougainvillea spectabilis total chlorophyll
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content was found maximum for Rajasthan University (2.045 mg/g) and minimum for Jhalana Doongri (1.31 mg/g). In *Melia azedarach* and *Ficus religiosa* total chlorophyll content was also found maximum for Rajasthan University i.e. 1.85 mg/g and 1.75 respectively, whereas minimum for Jhalana Doongri (1.32 mg/g) and Jagatpura (1.25 mg/g) respectively. Thus the results of the present study revealed that the chlorophyll content was found high in *Azadirachta indica* and *Bougainvillea spectabilis* which shows that these two species were more tolerant to pollutants.

Over all total chlorophyll was found to be high for Rajasthan University, whereas it was recorded low for Jhalana Doongari and JLN Marg. Loss in total chlorophyll content of plant depends on the degree of pollution. Degradation of photosynthetic pigment indicates air pollution.