CHAPTER I

INTRODUCTION
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From times immemorial minerals have played significant role in human civilisation and cultural development. The history is full of evidences how man resorted to use of hard rocks and minerals for his survival during pre-historic era - Palaeolithic, Mesolithic and Neolithic periods. The importance of the use of minerals increased considerably during the historic era especially in the areas marked by advanced human civilisation of the world. There are several recorded evidences of the use of metals by Greeks, Persians, Romans, Egyptians, Phoenicians and Chinese etc.

Mineral is defined as a ‘naturally occurring homogeneous inorganic substance having distinctive physical properties, usually a regular interval molecular structure and a more or less definite chemical properties’ (Chatterjee, 1993, p. 6). According to Mines Act, 1952, mineral means any substance which can be obtained from the earth surface. The role of minerals in the modern existence is of great economic significance both for people and nation as a whole (Krishnaswamy et al, 1988). The exploitation of natural resources affects the eco-system and all forms of life are influenced by it. As an important resource, mineral, mining and its related activities have profound and wide influence on the earth’s natural environmental. It excersies both positive as well as negative influences. While it contributes immensely to
the enhancement of comfort and living standard of people, it pollutes the air, water and leaves unrepairable scar on the surface of the earth (Keller, 1985). Its hazardous effects on the landscape and the traditional socio-economic and socio-cultural values have been very well noted by Kulms (1989).

A quantitative assessment of the extent of damage caused to the environment by mining industry is difficult to estimate. However, according to the World Watch Institute of Washington, U.S.A. the total cost of restoration of the environment damage caused by the human activities may be of the order of $ 150 billion a year during the next decade. It is, therefore, important that further deterioration of environment in future is at least minimized. In this task, the experts in mining have definite role to play, because mining and processing are the factors causing environmental pollution, the restoration of which requires costly investment (Archer et al, 1987). The spatial appraisal of the minerals and the associated problems due to extraction can be of great value in policy formulation and, thereby, restoration of the damage.

1.1 Statement of the Problem:

India has long tradition of mining activity. However, exploitation of minerals at the modern scale is only a recent phenomenon. The country is quite rich both in terms of variety and reserves of minerals. In 1994-95 sixty one minerals were mined. Of these, 10 belonged to
metallic, 48 to non-metallic and the remaining to the fuel category (Indian Bureau of Mines, 1994-95). As at present there are 3,083 mines which have been identified in different parts of the country (Appendix II). This is one of the major employing sectors as both public and private mining activities combined together provide employment to about 11.16 lakhs people. According to Indian Bureau of Mines the total value of minerals produced in the country during 1994-95 was Rs. 28,338 crores registering an increase of about 12 percent over the figures of 1993-94. It has been estimated that the mining sector contributes 1.6 percent of the Gross Domestic Product of the country.

The state of Himachal Pradesh has abundant reserves of non-metallic minerals. However, its exploitation is only a belated feature. Owing to difficult topography and harsh climatic conditions, the mineral exploitation is confined only in some selected areas. While the mining method is mostly traditional and labour intensive, the unscientific and hapahazard exploitation of mineral resources has been posing great challenge to the ecological balance in the fragile mountain environment. But despite these ill-effects the mining activity in this mountaineous region continues due to socio-economic reasons. As at present the scale of prospecting is very small but the state has great potential for future.

This dissertations aims at identifying the mining areas and pinpointing the ill effects of mining by selecting some case studies. This
type of study may help in evolving new thinking and approach towards mining activity which may be environmentally safe, friendly and free from any adverse effects on human health.

1.2 Aims and Objectives:

Almost all minerals are non-renewable natural resources available to be exploited by man for raising the living standards. But without appraisal and management it may have very adverse impact on environment. Despoliation of land through mining is the quite alarming which affects the entire eco-system. Larger the mining operations greater are the environmental effects. The present study has been undertaken with the following objectives:

1. To evaluate the spatial distributional pattern of mineral resources, production and reserves.
2. To highlight the nature and extent of mining activities and also its impact on the economy of Himachal Pradesh.
3. To assess the environmental impact of mining activity on immediate physico-cultural environment.
4. To suggest preventive measures for the protection of deteriorating environment.

Review of Literature:

As an important economic activity, mining has great geographical implications because it occupies some space and its environmental
impacts are of very severe nature. There are several western scholars who have attempted to highlight the positive and negative aspects of mining in different parts of the world. Thomas (1956), Pounds (1958), Kohn et al (1958), and Marnell et al (1965) have attempted to explain the ill effects of coal mining. Thomas points out the high incidence of dust diseases among workers employed in coal and slate mines. The effects of mining are not always negative as pointed out by Young (1965) in case of bauxite in Jamaica. According to him, the educational facilities, public health services and improved agriculture have been the positive aspects of bauxite mining. Ross (1967), however, points out the encroachment of mining activity on the town of Asbestos in Quebec (Canada). The urban activities have been dispersed due to mining extension and the town lacked the identifiable focal point. Friedenburg (1975), on the other hand has explained the multiple effects of mining operation in underdeveloped countries. He is of the view that the purchasing power of the mining workers increases due to wages; the infrastructural facilities like schools and hospitals come into existence which obviously result in good health and better life. Haas (1975) points out about the loss of agricultural land particularly sugarcane farming and negative influence on tourism activity in Jamaica due to bauxite mining. The role of mineral deposits in boosting the economy of India has been pointed out by Schnitzer (1975). The extraction of mineral and mineral oil in Brazil and
Iran has been discussed by Reuther (1975 and 1976). According to U.S. Department of Interior (1976), the effects of mining on environment depend upon steepness of terrain, amount of precipitation, temperature, chemical characteristics of minerals and method of mining.

The problems of labourers employed in the tin mines of Malaysia has been enumerated by Majid (1979). A distinction has been made by Gocht (1980 and 1987) between small scale mining sector and large scale mining sector. The advantages associated with small sector mining are low capital investment, small consumption of energy, intensive labour and modest mechanisation. The disadvantages associated with this are low output, high cost of operation and govt. assistance in the form of interest loan and tax relief, besides negative social aspects such as poor working conditions, high accident rate, low wages unskilled and child labour etc. These are the characteristics of small scale mining sector in Latin America, Africa and Asian countries. Lorenz (1980) has discussed the role of mining in El Salvador. India’s geology and mining industry has been discussed in detail by Steiner (1981). Stein (1984) observes that mineral as a raw material is very unevenly distributed throughout the world. He concluded that environmental impacts of mining are change in landscape, ground water conditions, dumps of over burden, tailing ponds and chemical effect on soil. According to Stein forest land, agricultural land and wild life are affected by mining. Gartner (1985) and Keller
(1985) have concluded that the open cast mining of tin and coal has disrupted the hydrological network. Archer et al (1987) identified different kinds of impacts of over exploitations of mineral resources firstly, it turns into irreversible drain on the supply of naturally occurring raw materials. Secondly, in the process of mineral extraction, toxic solids, liquids and gases are injected to the biosphere faster than its natural cleaning capacity. Thirdly, mismanagement of mining leads to reduced productivity and severe effects on human health. Schucht (1988) and Kulms (1989) have examined the marketing and financial aspects of mines. Bond (1990) has presented an account of range of environmental impacts taking place at various stages of mineral extraction and about its reclamation activities. Colten (1991), and Godfrey (1992) have also examined the physical and social impacts of mining activity. Priester et al (1993) conclude that mining activity results into technical risk to human health and politically induced risks to the environment. Robb (1994) and Robb and Robbinson (1995) have also studied the effect of the exploitation of fossil fuels like coal.

There are several Indian scholars who have also contributed significantly in this field of study. The mention may be made of the studies of Karan (1958) on the mica belt of Bihar, Negi (1967) on the mineral resources of Kumaon and Garhwal, Munshi (1965) on the mining settlements in tribal belt of Ho and Mundari, Pandey (1967) on the tale
and soapstone deposit of Kandyal Gaon in Tehri Garhwal and Sharma (1973) on the appraisal and prospecting of mineral resources in Chattisgarh region. While examining the urban pattern in Chotanagpur, Prasad (1977) considers mining as the major cause of urbanisation in this region. However, exploitation of mineral resources here has generated several social problems, such as residential congestion, hells slums, scarcity of drinking water, exploitation of workers and high incidence of fatal diseases and crimes. The environmental impact of mining has been examined by Kumar et al (1985) in Bokaro belt and Sen (1985) in Damodar basin. They conclude that the faulty excavation in the mine results in wasteland, waste dumps, shrinking of cultivable land, accelerated soil erosion and washing away of top soil. Pollution and deforestation are also quite common features in these areas. Misra and Misra (1986), while examining the role of mineral in human survival and development, trace the effects of mining on settlements, agricultural land, infrastructural facilities, and flora and fauna at the global scale. The copper are mining in Ingaldhal in Karnataka has been studied by Sankar (1986). Banerjee (1987) has studied the environmental impacts of phosphate mining. He underlines the enormous damage done to the ecosystem due to phosphate extraction. The contamination of water and soil and degradation of vegetation due to copper, lead and zinc mining in Khetri and Zawar in Rajasthan has been discussed by Haque (1987). He
also points out how smelting operation of these minerals turns the natural water bodies acidic in nature. Singh et al (1988) have pointed out the similar problems in Mussoorie due to phosphate mining in that area. Raymahashay (1987), has pointed out that the clay minerals are capable of removing major amount of cationic pollutants. Khoshoo (1988) in his study of mining has identified five types of environmental impacts. These are water pollution, air pollution, despoliation of land, deforestation and noise and ground vibration. In a geographical study of western ghat, Dikshit (1991) has discussed the environmental impact of extensive mining. Malkania (1992) has traced the impact of mining on a aquatic environment. He is of the view that surface and ground water are affected due to acidic drainage from the mine. In some of the recent studies by Nagchaudhari (1991), Ghose (1992) and Misra (1992), the impact of metal and non-metal toxicity around the mines has been pointed out. Some of the plant die on account of this. The other problems reported by them are soil erosion, groundwater pollution, noxious gases, noise pollution particularly due to drilling, blasting and transportation.

These studies provide reasonably good theoretical background within the frame of which various aspects of mining in different areas can be analysed.
1.4. Major Hypotheses:

The present study proceeds within the broad frame of some of the hypotheses. The major hypotheses as under:

1. The complex geological structure has given rise to a variety of minerals in the study area.

2. The mining activity has several physical and socio-economic environmental impacts which are both positive and negative.

3. Mining in the area characterised by acute angles results into serious landslides and mass movement.

4. The problem of mining is much more serious in fragile environments.

The present study centres around examining these hypotheses.

1.5. Methodology and Data Sources:

The descriptive methodology has been followed to examine the mineral resources of the study area and the empirical-analytical approach has been followed to assess the environmental impact of the mining activity in the fragile environment of the state of Himachal Prades. This has been done with the help of people’s perception and field observation in the three case study areas. This is, thus, basically a case study approach that has been followed in the research. The analysis has been supported with the help of maps, diagrams and photographs. There are 31 maps, 17 diagrams, 39 photoplates in this dissertation. The present study is based on primary as well as secondary data.
The primary data has been collected through field observation, interview and questionnaires. A detailed questionnaire is appended at the end (see Appendix VII). The secondary data has been collected from published and unpublished sources both from official and non-official channels. The district gazetteers, the census reports, the publications of the departments of forest and farming agriculture, industry, geological wing and geological survey of India form the base of secondary data.

1.6. Area of the Study:

Himachal Pradesh is one of the hilly states of Union of India situated in western Himalayan region. It lies between 30° 22' 40" - 33° 12' 40" North Latitudes and 70° 47' 55" - 79° 04' 20" East Longitudes (see Fig. 1.1). It has an area of 55,673 sq.kms which is 1.62 percent of the country and 10.54 percent of the total Himalayan landmass. It is bordered by Jammu and Kashmir in the north, Punjab, Haryana in the south-west and Uttar Pradesh in the south-east. The state forms the international boundary with the Tibet part of China in the north-east. Administratively the state is divided into 12 districts which are further subdivided in 103 tehsils and sub-tehsils and 72 development blocks. This state of scenic beauty has very complex geological structure and relief features; its altitude varies between 350 metres to 6975 metres above the mean sea level. According to 1991 census, the total population of the state is 51,70,877 persons which is 0.62 percent of the total
LOCATION MAP OF STUDY AREA.

Fig. 1.1
population of India. Shimla, once upon a time the summer capital of India, serves as the capital of study area. The genesis of minerals has great association with the rock structure. The variety of rock structures in Himachal Pradesh indicates the presence of variety of minerals - metallic, non-metallic and mineral fuels.

1.7. Organisational frame:

The theme of this dissertation has been organised into six chapters.

The first chapter presents the theoretical background by focussing on the importance of minerals and mining activities, statement of the problems, aims and objectives, review of literature, major hypotheses, data sources and methodology. A brief reference of the study area i.e. the state of Himachal Pradesh has also been made here. A detailed geographical profile of the study area has, however, been presented in the second chapter. This chapter deals with geological structure, physiographical features, drainage system, climatic characteristics, soil types, land cover types, characteristics of population, rural-urban settlements and economic structure of the state of Himachal Pradesh. This has been presented as a background material for chapter three which examines the spatial distribution of mineral resources of the study area in depth. An attempt has been made to present the production as well as reserves of some selected minerals as well. The analysis reveals that the study area has great potential as far as the non-metallic minerals are concerned.
The mining and extraction of the minerals in the state of Himachal Pradesh, which is ecologically fragile and environmentally vulnerable, leads to several problems. In chapter four the profile of three case study areas has been presented. One case study deals with limestone mining, in Kamrau, Sirmour district; the second centres on the rocksalt mining in Guma, Mandi district; and the third one dwells upon the slate mining activity in Gehra, Chamba district.

The environmental impact of the mining activity in Himachal Pradesh has been examined with the help of people's perception and field observation in chapter five. The three case studies referred to in chapter four form the basis for this analysis. Finally, the summary, conclusion and policy implications for sustainable and eco-friendly mining activity have been presented in chapter six.
References:


