CHAPTER VI

SUMMARY, CONCLUSION AND POLICY IMPLICATION
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India is quite rich in variety as well as in different types of minerals. There are nearly 67 minerals which are extracted from the 3083 mines (650 metallic and 2,433 non-metallic) identified in the country. The importance of mineral is evident by the fact that it provides the employment to about 11.16 lakh people and contributes nearly 1.6 percent of the Gross Domestic Product of the country. The state of Himachal is abundantly rich in terms of mineral resources and some of the minerals are also being exploited. The fallout of mining activity has several manifestations but there is hardly any study which deals with the mineral resources and impact of mining activity in this state. The purpose of this dissertation is to present an exhaustive account of mineral resources and underline the impacts of mining activity in this fragile environment by selecting few case studies.

The state of Himachal Pradesh has a very fragile environment as it is characterised by the presence of Himalayas which is geologically very unstable zone. Spreading over an area of 55,673 sq.kms, it constitutes 1.62 percent of the total area of the country and 10.54 percent of the total Himalayan land mass. The mean elevation varies between 350 metres to 6975 metres above the sea level. There are several peaks which are snow-capped throughout the year. Based on geological structure and relief
features it may be divided into shiwaliks, lesser Himalaya and greater Himalaya. The minerals have great association with the genesis of rocks. Series of rock systems have resulted into a variety of minerals. The major rivers which drain the Himachal Pradesh are the Sutlej, the Beas, the Ravi, the Chenab and the tributaries of the Yamuna river. It is not only the topography which is very unique, climatic conditions are also quite variable. The rainfall varies from less than 600 mm to more than 2,600 mm and Dharmshala records the second highest rainfall of the country. The study region may be divided into five climatic zones which vary according to altitude: (i) The sub-tropical zone (below 900 metres), (ii) Warm temperate zone (900-1800 metres), (iii) Cold temperate zone (1800-2400 metres), (iv) Cold high mountain zone (2400-4000 metres), (v) Sonwy frigid zone (above 4000 metres).

According to satellite imagery more than 31 percent area is snow covered. Forest area next to it as it occupies 26 percent area. Nearly 16 percent area is under waste land and net sown area is about 18 percent; water bodies cover 1.4 percent, and grass land spread over 4.5 percent of the total area. The built up area is confined to only 0.2 percent of the total area of the Himachal Pradesh. The population of the state has been increasing continuously and according to 1991 census the total population is 51,70,877 persons registering an increase of 20.79 percent during the previous decade (1981-91). This is one of the least populated
states as it accounts for 0.62 percent of the total population of the country. The density of population varies between 2 persons per sq.kms in Lahaul-Spiti district and 330 persons per sq.kms in Hamirpur district. The overall density of population is 93 persons per sq.kms. The sex ratio is highly imbalanced as it varies between 817 females to 1105 females per thousand males in Lahaul-Spiti and Hamirpur district respectively. The overall sex ratio is 976 females per thousand males. This is one of the least urbanised states of the country as the urban population is just 8.68 percent of the total population lying in 58 towns mostly concentrated into lower Himachal State. According to 1991 census there are 16,997 rural settlements of different sizes. Shimla district is the most urbanised as 20.42 percent of its population lives in urban areas. Besides being the capital, Shimla is the largest urban centre in the state of Himachal Pradesh. The degree of primacy of Shimla is very high. The work force constitutes nearly 34 percent and major segment of the population depends upon agriculture as primary workers constitute 69 percent of the total work force. The secondary sector has not fully developed as it employs 5 percent of the total workers. The workforce in tertiary sector is about 20 percent only. Agriculture, forestry, horticulture, mining and tourism constitute the major sources of the Gross Domestic Product in Himachal Pradesh.
The reports of Geological Survey of India confirm that Himachal Pradesh is quite rich both in metallic and non-metallic minerals. There are 30 minerals in the state. Some strategic minerals have also been reported to be found in the state. But all of them are not being extracted. This is because the terrain is inhospitable, climate is harsh, infra-structural facilities are poor and accessibility in this state is very low due to poor transportational network. There are six major minerals such as rocksalt, limestone, dolomite, gypsum, baryte silica sand and eight minor minerals such as limestone, shale, building stone, gravel, boulders, sand, clay and slates which are being extracted as at present. All these minerals are in great demand locally. The are two types of mining which are quite common in Himachal Pradesh are open pit and underground. Underground mining is practised on baryte mining in Andhra Khallah at Sirmour district and rock salt mining in Guma in Mandi district. Both public and private sector are involved in the mining in the state of Himachal Pradesh. Nearly 15,000 people are directly depended on mining for their livelihood.

In order to understand the processes and details of environmental impact of mining, the three case studies have been undertaken. These three case studies pertain to Kamrau limestone mining area, Sirmour district, rocksalt mining area, Mandi district, Gehra slate mining area in Chamba district. The analysis and interpretations of environmental
impact in the case studies have been done through field observation/visual perception and people's perception. The visual perception is based on photographs and field observation and the people's perception is based on questionnaires. There are basically two approaches to assess the environmental impact - environmental and ecosystem approaches. In the present analysis, the blend of the two has been followed by laying emphasis on ecosystem approach. The three case studies reveal that the physical environmental impact is quite alarming in case of limestone, rocksalt and slate mining areas because the problems of landslide / land subsidence are quite common in three case studies. Likewise, there is a problem of waste material flow and mass movement in limestone mining and slate mining because the mining activity is being done at very acute angles' slope. The rock salt mining due to underground activity does not pose as serious threat as in case of open-cast mining in the other two case studies. The socio-economic impact is negative in some cases but positive in other cases. It is negative in the case that the productive land is being very adversely affected and even the forest cover has been declining. But the quality of life appears to have improved as revealed by people's perception. The wages have increased and some infrastructural facilities such as schools and banks have come up near the mining sites. The accidents of death and injuries due to mining in case of slate mining of Gehra are quite revealing. This is especially noticeable because mining
is mostly illegal in Gehra slate mining area and, therefore, labourers do not get suitable compensation. The aesthetic loss due to degradation of natural landscapes is yet another problem which needs to be addressed.

6.1. Eco-Friendly Model of Mining:

The model building is an important exercise as it helps to bridge the gap between reality and abstract. The abstraction is necessary for making the description analytical and explanatory (Chorley and Haggett, 1967). The proposed eco-friendly model of mining activity (Fig. 6.1) is based on the description of the impact analysis. There are seven physical and an equal number of socio-economic impacts which have been broadly identified. The remedial measures to counter these impacts have also been put into boxes. All of these need to be attached at the policy level either by State Government or by the Central Government. This is to be done within the broad umbrella of monitoring and management and Environmental Impact Assessment (EIA). While the monitoring and management should take into account the exploration and conservation aspects of mineral besides laying emphasis on contouring / geological survey and environmental planning, the environmental impact assessment should be a continuous process in any mining area whether the extraction is on large scale or small scale. This model, if applied in real ground situation, can be very effective in promoting eco-friendly mining.
Fig. 6.1
6.2. Policy Measures:

There are several policy level interventions which are necessary to make the eco-friendly model operational. These are to be taken care of either at the state level or Central Govt. level as the case may be. These policy measures are as under:

1. The mining leases should not be permitted for an area below 20.0 hectares and no mining should be allowed above 45° of slope. The mining above this slope may lead to hazardous consequences such as land slips and mass movement.

2. The mining should not be permitted if it is estimated that the overburden is more than 30 percent of the total mineral produce.

3. The mechanisation should be allowed only in case of mining at large scale. Otherwise this leads to dust problem which is harmful for plants as well as the human health.

4. It is necessary that some control mechanism be exercised in order to stop the flow of toxic and waste materials in the nearby water sources. This may result into water pollution.

5. The top to toe mining with 2 metre benching may protect the land from being degraded and this aspect should form the part of policy planning.

6. The aesthetic loss due to subsidence or land degradation may be controlled through afforestation. The social forestry / agroforestry
should form part of mining activity to confront the problem of environmental pollution.

7. The mining nearby the settlements - rural or urban, should not be permitted or else this may result into noise pollution and several other socio-economic problems.

8. The productive land and area covered by forests should not be allowed to be leased out for the purposes of mining.

9. The natural as well as the artificial water sources should be avoided for the purposes of mining.

10. Adequate provisions should be made for the periodic check of the health of labourers because the mine workers suffer from several diseases such as asthama, tuberculosis, jaundice etc. In this context it is important to mention that the use of child labour is quite common and this social problem must be dealt with seriously.

11. Illegal mining is quite common in the hilly terrains. The reckless extraction of minerals can be stopped by having a complete check on the illegal mining.

12. Accidents due to blast occur quite frequently and, therefore, provisions for adequate safety measures must be ensured before the mining is allowed. This is important that the blasting is done by trained blasters under proper supervision and care.
The Govt. of India, in order to stop the reckless extraction of minerals, established Indian Bureau of Mines in 1948. The object was to promote research and development in the field of mining. The Mining and Minerals (Regulation and Development) Act was also passed in 1948 in order to support the objectives of Indian Bureau of Mines. The Act was, however, suitably amended in 1957 in order to plug some of the loopholes. The Indian Bureau of Mines in collaboration with Geological Survey of India has been engaged in exploration and conservation as part of mineral planning policy. Some radical changes have been made recently by introducing new mineral policy in 1993. This policy allows the domestic as well as foreign private concerns to invest in mineral extraction and export. The private companies attempt to maximise their profits by indulging in reckless mining (Misra and Puri, 1997) which is against the national interests and eco-friendly mining. This aspect should be taken up seriously while reformulating the mineral policy.
References:
