ENVIRONMENTAL IMPACT OF QUARRYING : A CASE STUDY OF SHIMLA DISTRICT

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ABSTRACT

The unplanned and unscientific quarrying activities in the Shimla district give rise to unstable condition of slopes, recurring creep, landslides, vegetation depletion, health and environmental problems. Evidences indicate that quarrying is performed mainly for construction purposes. An attempt has been made to study the environment impact of quarrying in Shimla district. A number of quarrying sites have been identified in Shimla district. An increase in population of the study district has enhanced the quarrying activities. The field investigations and analysis of data indicate that environmental conditions, terrain and vegetation have been affected adversely due to quarrying operation along with the health of human being working there.

Key Words: unplanned, quarrying, landslides, environment.

1 INTRODUCTION

Environment is surroundings of man in which he lives. Environment is dynamic in nature. The early life of man has been affected very much by his Environment. This is the reason that scholars have quoted a term as *Determinism*. The essence of the deterministic philosophy is that the history, culture, activities of man, his life-style, and the cultural landscape of a social group, tribe or nation are entirely dependent on the physical factors of environment. But with the passage of time advancement in the field of science and technology man's capability to affect the environment has been progressively increased. At the advent of human being on the earth and gradually increase in population, the demands of food, shelter and clothing increased at an unprecedented rate. The activities of man associated with the provision of these demands have affected the environment to a very great extent.

Natural resources are the base of any nation. The economic growth of nation depends primarily upon its natural resources. The alarming increase in population has forced man to overutilize its resources to meet the demands of populace. The overutilization of resources has created disharmony between man and environment. Man's exploitation of natural resources has led to a variety of environmental problems associated with water, air and land pollution.

The people living in the Himalayan region have been quarrying hard rocks for constructing their houses since times immemorial. However, regular quarrying for minerals was started in the Himalayan region in the post-independence era. A number of quarrying leases for metallic and non-metallic minerals were granted. The stones for the construction of buildings are widely quarried in different part of the Shimla district.

The usual method of quarrying is first to strip the area of all trees, Shrubs and herbs. Thereafter the top soil is removed either by hand tools (in case of small quarries) or by heavier earth moving equipments. The soil debris is thrown down the hill slope. Benches or terrace-like features are cut in the hillside and the building stone is excavated.

Shimla district forms a part of the lesser Himalaya and has been selected for the present paper. Among the various human activities quarrying of stone is one of the important and dominant activities in the Shimla district.

The quarrying of stone is practiced in study area since times immemorial. The quarrying of stones has left repulsive wounds on the environment. In this paper an attempt has been made to study the environmental impact of stone quarrying in Shimla district.

2 STUDY AREA

Shimla district is located in the south-east border of the state. It is bounded by Kinnaur district in the north-east, by Kullu and Mandi district in the north-west, by Solan and Sirmaur districts in the south-west and by the Uttar Pradesh is situated on a transverse spur of central Himalayan system. The Shimla Himalaya which extends from 31^0 $0^{'}$ north to 31^0 $35^{'}$ north latitude and 77^0 $0^{'}$ east to 78^0 $0^{'}$ east longitude, ranging from 680 metres to 3400 metres above mean sea level, consist of the drainage units of Giri, Pabbar in south and Satluj in north covering the area of 1434sq.kms.

The area exhibits mountainous topography having deep valleys and steep sided parallel ridges. The ridges run almost north-west and south-east direction, overall the topography of the area is rugged.

Shimla district is situated in the lesser Himalaya. It is surrounded by main central thrust in north and by main boundary fault in the south. The geological formation of this area in and around Shimla is predominantly covered by Shales, Conglomerates, Quartzite, Slate and Limestone.

Map 1

3 QUARRYING SITES OF SHIMLA DISTRICT

In Shimla district significant minerals are not available but the quarrying is done mainly to extract building stones. The various quarrying sites have been identified in the Shimla district (Map 1). Some important among them are as follows:

Table-1

Sr. No.	Quarrying Sites	Area	Quarrying Purpose (Building Stone/Stone Crasher/Sand)
1.	Dario	Narkanda	Stone Crasher
2.	Jhakri	Rampur	Stone Crasher
3.	Ishta	Theog	Stone Crasher
4.	Tihana	Theog	Stone Crasher
5.	Dutt Nagar	Rampur	Sand
6.	Gawahi	Shimla	Building Stone
7.	Kaun	Junga	Building Stone
8.	Rewali	Kumarsain	Sand

Source : Directorate of Industries

4 PURPOSES BEHIND QUARRYING

In Shimla district quarrying of stone is done for various purposes. The following factors are responsible for accelerated quarrying in Shimla district.

4.1 Construction of house

In the early period mainly the houses were made up of stone and clay therefore, the quarrying of stones for the construction of houses was very common. Now in the urban areas the construction material has been changed into concrete. Even in the remote areas where road facilities are not available or people who cannot afford cemented and concrete material extract stones for the construction of their houses.

4.2 Construction of retaining walls

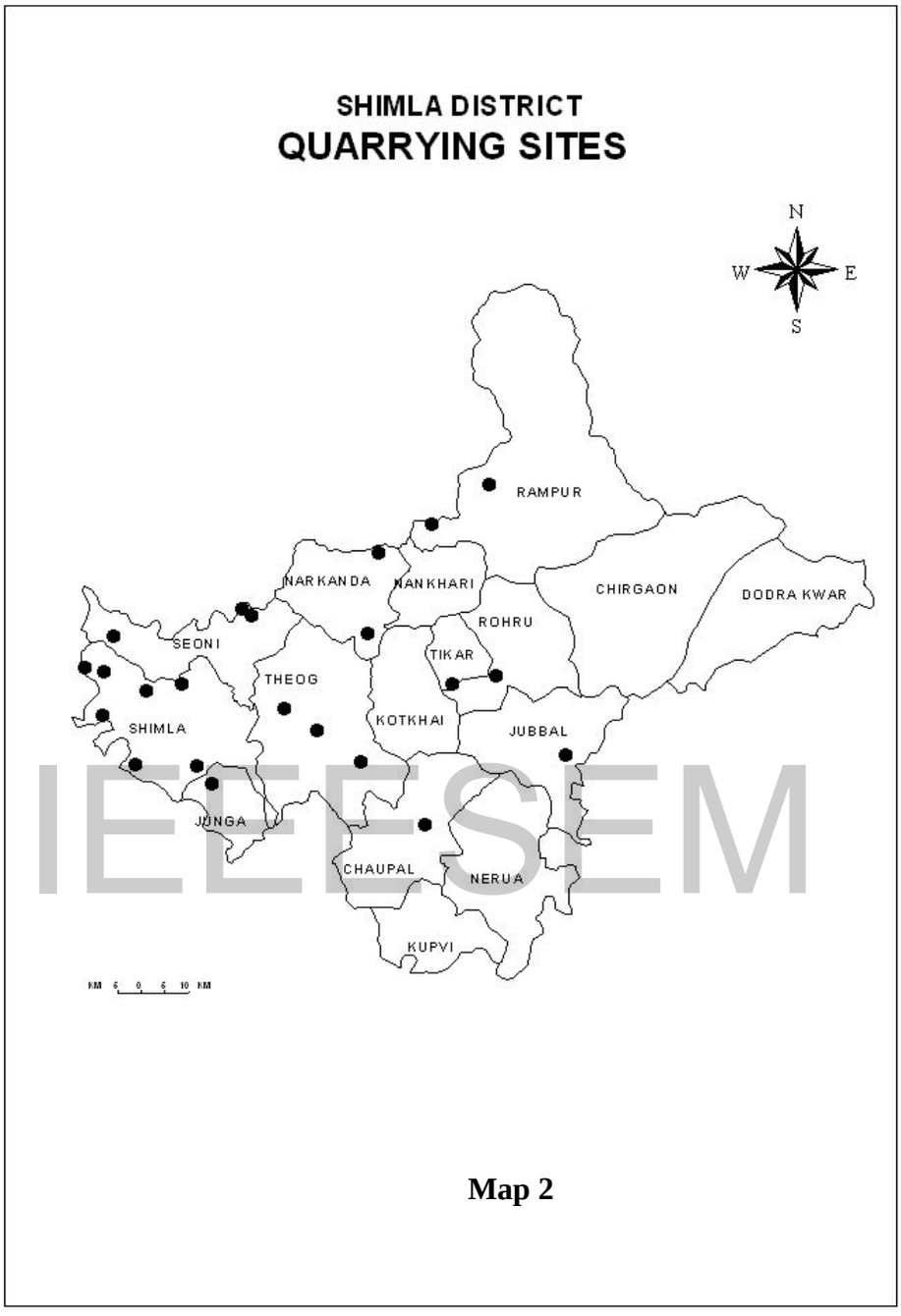
The stones are extracted for the construction of retaining walls to widen the roads, to stabilize the slope affected due to landslide activities.

4.3 Crushers

In the modern world the construction material has been changed. Numbers of stone crushers are deployed to produce varying size of stones. These varying size stones are in use for RCC walls, metalling of roads and for construction of residential as well as official buildings.

5 ENVIORNMENTAL IMPACT

The quarrying activities have influenced vegetation, soil, terrain, air, water, wild life habitat and consequently human beings of the study area. The quarrying activities have affected environmental conditions of Shimla district to a very large extent. A brief description of environment degradation due to quarrying activities is discussed as under:



Map 2

5.1 Vegetation depletion

The quarrying of stones generate very large amount of waste material. This material is deposited mainly along the quarrying site on the sloppy surface. This debris during rainy season gets saturated with the water and debris flow and associated hazards are common. The moving debris on the slope has uprooted large number of trees every year. It is due to the result of debris flow, tree trunks have attained curvature and tilting of tree is also common in many parts of the Shimla district (Fig.1). In Shimla district vegetation depletion due to dumping of debris on the steep slope is very common. Riyuni, Chambi, Raksa villages are very much affected sites due to stone quarrying.

Tilted Tree Trunk

Fig. 1

5.2 Soil Erosion

The other problem related with stone quarrying is soil erosion. The quarrying of stones involves the removal of top soil cover. The removed soil becomes loose and unconsolidated and running water easily carry it, leading to soil erosion. The soil erosion has affected the fertility of the area. Tones of soil of Shimla district get eroded by running water every year. The problem of accelerated erosion has affected the middle and lower slopes of the Shimla district. A large number of rills and gullies have formed in tracts lying below the belt of quarries.

5.3 Landslides

Landslide is very common in the Shimla district due to quarrying activities. The quarrying of stone is done on middle and lower slopes. It is not kept in mind the stability of terrain during quarrying. The cutting of slope at the toe has destabilized the resistance force at many places as a consequence the upper portion moves downwards. This is due to unplanned and unscientific quarrying of stones the rock structure becomes loose and unconsolidated, therefore, landslips and shooting stones are very common in the upper Shimla such as Rampur, Rohru and Jubbal. This has caused the death of number of people in last few years. The debris excavated from the quarrying face is allowed to roll done the hill slopes. This results in the formation of landslides.

5.4 Air Pollution

The quarrying operation emits very large amount of dust into the sky. These dust partials on one hand is affecting the environmental conditions and on other hand affecting the physical conditions of workers of the study area involved in the quarrying operation.

6 ENVIRONMENT IMPACT ANALYSIS

An attempt has been made to introspect the environment impact due to stone quarrying in the Shimla district. Short, medium and long terms effects on the environment of Shimla has been assessed using the technique employed by Negi, S.S., 1990.

The following table shows the various impact dimensions of stone quarrying in Shimla district.

Table-2

Impact	Time			Societal			Spatial		
	Short Term	Medium Term	Long Term	Some People	Group	All Persons	Local	Region	District
1. Vegetative Live	-	x	-	-	-	x	x	-	-
2. Soil Erosion	-	-	x	-	x	-	-	x	-
3. Landslides	-	x	-	-	x	-	x	-	-
4. Air Pollution	-	x	-	-	-	x	-	-	x
5. Health Problems	-	-	x	-	x	-	-	x	-
6. Natural Habitat	-	x	-	-	x	-	-	x	-

Source : Negi, S.S (1990)

7 CONSERVATION BASED MANAGEMENT

There is a need for sustainable development of environment of the Shimla district. Some recommendations have been suggested.

7.1The stone quarrying should be restricted on the slope exceeding 45^0 to 50^0.

7.2 The debris generated after quarrying should be deposited into the depression of quarrying site. It should not be disposed on vegetative slopes and stream valleys.

7.3 The quarrying should be done under the supervision of trained and qualified experts.

7.4 The use of explosive should be done away from the residential areas.

7.5 The quarrying sites become unfertile and barren. The government should implement some plans for afforestation on the quarrying sites so that environment degradation can be impose to some extent.

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