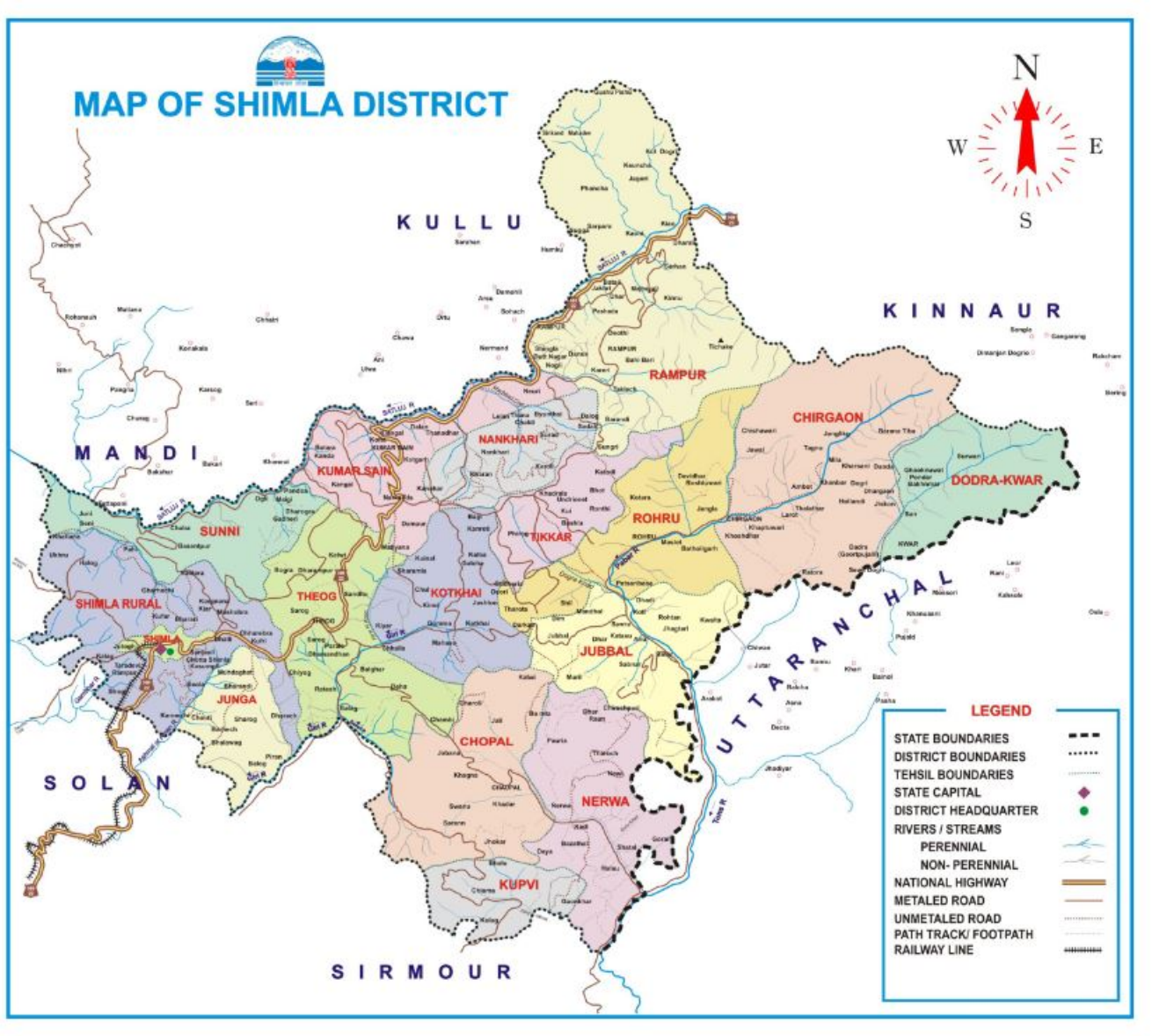
DISTRICT SURVEY REPORT-2024
District- Shimla Himachal Pradesh



DISTRICT SURVEY REPORT FOR SAND MINING OR RIVER BED MINING AND OF MINOR MINERALS OTHER THAN SAND MINING OR RIVER BED MINING

Prepared and submitted by Department of Industries, Himachal Pradesh

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Finalized & approved by SEIAA, Himachal Pradesh in its 70th meeting (PARIVESH-1) held on dated 30th Sept. 2024 vide Agenda Item No. 1.

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(Non Sand Mining)

Executive Summary DSR

District Survey Report (DSR) is a comprehensive document prepared to regulate riverbed and hill slope mining activities within the district. This report is essential for sustainable management of riverbed mining, ensuring that the extraction of minerals is conducted in an environmentally sound and socially responsible manner. The preparation of DSRs is mandated under the Sustainable Sand Mining Management Guidelines, 2016.

District Survey Report of riverbed mining are indispensable tools for the sustainable management of riverine mineral resources. They offer a structured approach to resource assessment, environmental protection, regulatory compliance, and stakeholder engagement. By fostering sustainable mining practices, DSRs contribute significantly to environmental conservation, socio-economic development, and the overall well-being of communities dependent on river ecosystems.

As per the EIA Notification, 2006 and its subsequent amendment vide S.O. 3611(E) dated 25th July, 2018 issued by MoEF&CC, GoI, the main objective of the preparation of District Survey Report (as per the Sustainable Sand Mining Guideline) is to ensure the identification of areas of aggradations or deposition where mining can be allowed; and identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited and calculation of annual rate of replenishment and allowing time for replenishment after mining in that area.

- **Key Aspects of District Survey Report**

1. **Assessment of Resources**: DSR provide a detailed assessment of available mineral resources in the riverbeds within the district. This includes data on the quantity, quality, and distribution of sand and other minor minerals. By accurately estimating these resources, the report aids in preventing over-extraction and depletion of minerals.
2. **Environmental Impact Analysis**: The report include an analysis of the environmental impact of riverbed mining. This encompasses the effects on river morphology, hydrology, aquatic ecosystems, and biodiversity. Understanding these impacts is crucial for mitigating adverse environmental effects and preserving riverine ecosystems.
3. **Regulation and Compliance**: DSR serve as a regulatory framework for riverbed mining operations. They outline guidelines and standards for mining practices, ensuring compliance with national and state environmental laws. This helps in curbing illegal mining activities and promoting legal and regulated mining.
4. **Sustainable Mining Practices**: By recommending sustainable mining practices, DSR help in minimizing environmental degradation. These practices may include controlled mining depths, restricted extraction zones, and periodic replenishment studies to maintain the ecological balance of river systems.
5. **Socio-Economic Considerations**: The report also takes into account the socio-economic aspects of riverbed mining, including the impact on local communities. This includes evaluating benefits such as employment generation and revenue for local governments, as well as addressing negative consequences like displacement and loss of livelihoods.
6. **Data-Driven Decision Making**: DSR provide a scientific basis for decision-making regarding riverbed mining. The inclusion of geospatial data, remote sensing images,

and field surveys enhances the accuracy and reliability of information. This data-driven approach supports informed policy-making and resource management.

7. **Stakeholder Involvement**: The preparation of DSR involves consultation with various stakeholders, including government agencies, local communities, environmentalists, and industry representatives. This inclusive process ensures that multiple perspectives are considered, leading to balanced and equitable mining practices.

- **Benefits of District Survey Report**

1. **Environmental Protection**: By identifying and mitigating the environmental impacts of riverbed mining, DSR play a crucial role in protecting river ecosystems, reducing erosion, and maintaining water quality.
2. **Resource Management**: Effective management of mineral resources is achieved through regulated extraction, preventing over-exploitation and ensuring the longevity of resources for future use.
3. **Legal Compliance**: DSR help in ensuring that mining activities adhere to legal requirements, reducing the incidence of illegal mining and associated environmental damage.
4. **Community Welfare**: By considering the socio-economic impacts, DSR help in safeguarding the interests of local communities, ensuring that they benefit from mining activities without suffering undue harm.
5. **Sustainable Development**: The integration of sustainable practices in mining operations contributes to the broader goals of sustainable development, balancing economic growth with environmental stewardship.

- While issuing any fresh permission for mining activity in the district the same is permissible only when the identified stretch is reflected in the DSR with its geo coordinates, quantity and geological profiling.
- The SEIAA/ SEAC while considering the cases for grant of EC need to assess with the help of DSR the proposed mining activity is within the identified stretches of river/ streams/ khads, matching the geo coordinates of proposed site and river stretch where the mineral is available by using ***kml*** files.
- In the DSR '**No Mining Zones**' are also listed which clearly give a view of stretches where no mining activity will be allowed and remain restricted.

"*No Mining Zones*" (NMZs) are critical areas identified within riverbeds where mining activities are strictly prohibited. These zones are delineated based on various environmental, ecological, and social criteria to ensure the protection of sensitive areas. The identification of NMZs is a key component of District Survey Report (DSR) for riverbed mining in India, aimed at promoting sustainable and responsible mining practices.

Criteria for Identifying No Mining Zones in DSR

1. **Ecological Sensitivity**: Areas with high ecological value, such as habitats for endangered species, breeding grounds for aquatic life, and regions with significant biodiversity, are designated as NMZs. Protecting these areas is crucial for maintaining ecological balance and biodiversity.
2. **Hydrological Importance**: Zones critical for maintaining river flow and groundwater recharge are marked as NMZs. This includes regions near riverbanks,

floodplains, and areas prone to erosion. Preserving these areas helps in sustaining water quality and quantity.

3. **Proximity to Infrastructure**: Areas close to infrastructure such as bridges, roads, dams, and human settlements are identified as NMZs to prevent structural damage and ensure the safety of human life and property.
4. **Cultural and Archaeological Significance**: Regions with cultural, historical, or archaeological importance are protected as NMZs to preserve heritage sites and prevent any damage due to mining activities.
5. **Community Dependence**: Areas that are vital for the livelihood of local communities, such as regions used for fishing, agriculture, and other traditional activities, are designated as NMZs. This ensures the sustenance of community livelihoods and social well-being.

Basis for appraisal of EC (River Bed Mining Projects)

Sl. No.	PP Details	Location with khasra Nos.	River/ Stream location	Coordinates (Lat Long)	Area of Mining lease (ha)	Period of Mining lease (Initial)		Period of Mining lease	
						From	To	Form	To
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Details of River/ Stream

S. No.	Name of the River or Stream	Total Length in the District (in Km)	Place of origin	Altitude at Origin
(1)				

Portion of the River or Stream Recommended for Mineral Concession	Length of area recommended for mineral concession (in kilometer)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in square meter)	Mineable mineral potential (in metric tonne) (60% of total mineral potential)

Mineral Potential

Boulder (MT)	Bajari (MT)	Sand (MT)	Total Mineable Mineral Potential (MT)

S. No.	River or Stream	Portion of the river or stream recommended for mineral concession	Length of area recommended for mineral concession (in kilometer)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in square meter)	Mineable mineral potential (in metric tonne) (60% of total mineral potential)
(1)						
(2)						
Total for the District						

PART I

DISTRICT SURVEY REPORT OF DISTRICT SHIMLA H.P

(River Bed Sand Mining and Other Minor Minerals)

1. Introduction

Minerals are valuable natural resources being finite and non-renewable. They constitute the vital raw materials for many basic industries and are a major resource for development. The history of mineral extraction in India dates back to the days of the Harappan civilization. The wide availability of minerals in the form of abundant rich reserves made it very conducive for the growth and development of the mining sector in India. The country is endowed with huge resources of many metallic and non-metallic minerals. The mining sector is an important segment of the Indian economy. Since independence, there has been a pronounced growth in mineral production both in terms of quantity and value. India produces as many as 87 minerals, which include 4 fuel, 10 metallic, 47 non-metallic, 3 atomic and 23 minor minerals (including building and other materials).

Minerals are classified into two groups, namely (i) Major minerals and (ii) Minor minerals. Amongst these two groups, minor minerals have been defined under section 3(e) of the Mines and Minerals (Regulation and development) Act, 1957. The minor minerals are further governed by "The Himachal Pradesh Minor Minerals (concession) and Minerals (Prevention of Illegal Mining, Transportation and Storage) Rules, 2015". The Minor minerals include building stones, gravel, ordinary clay, ordinary sand, limestone used for lime burning, boulders, kankar, murum, brick earth, bentonite, road metal, slate, marble, stones used for making household utensils etc. and other minerals not defined as minor minerals in the said Act are treated as major minerals. They include coal, kyanite, sillimanite, barites, chromite, fluorite, quartz, sand used for stowing purposes in coal mines and many other minerals used for industrial purposes.

The mining activities in the state of Himachal Pradesh can basically be categorized as in the large sector and in the small sector. The large sector comprises of limestone projects for manufacturing cement and other lime products while the small mining sector comprises the mining of minor minerals like sand, stone, bajri, slate, shale and clay etc. which are basically building materials to meet up the demand for infrastructure development of the state.

In pursuance to the orders of the Hon'ble Supreme Court dated 27.02.2012 in the matter of Deepak Kumar etc. vs State of Haryana and Others, prior environment clearance has

now become mandatory for mining of minor minerals irrespective of the area of mining lease. In order to comply with the judgment of the Hon'ble Supreme Court, the Ministry issued S.O.141 (E) dated 15.01.2016 vide which the District Level Environment Assessment Committee (DEAC) and District level Environment Impact Assessment Authority (DEIAA) were constituted. In the said Notification at point No.7 (iii) the procedure to prepare the District Survey Report (DSR) was laid down providing that a survey shall be carried out by the DEIAA with the assistance of Geology/Irrigation/Forest/PWD etc. departments. As, per the aforesaid, Notification dated 15.01.2016 the Geological Wing, assisted the DEIAA in the preparation of the District Survey Report during the year 2016 and the said District Survey Report prepared for District Shimla was approved by the DEIAA, after following the procedure laid down in the aforesaid Notification. It is also provided in the Notification No. S.O. 141 (E) dated 15th January 2016 that the District Survey Report (DSR) shall form the basis for the application for environmental clearance, preparation of reports and appraisal of Projects. The report shall be updated once every 5 years.

In the aforesaid notification dated 15.01.16, the Hon'ble High Court of Jharkhand at Ranchi in its orders dated the 11th April 2018 and 19th June 2018 in W.P. (PIL) No. 1806 of 2015, in the matter of Court on its Own Motion Versus the State of Jharkhand & Others with W.P. (PIL) No. 290 of 2013, in the matter of Hemant Kumar Shilkarwar Versus the State of Jharkhand & Others, has inter-alia directed the preparation of District Survey Report for the Sand mining or riverbed mining and for minor minerals other than Sand and bajri or delegation of the powers for preparation of format of District Survey Report of minor minerals other than sand and bajri to the State Government and/or District Environment Impact Assessment Authority and District Expert Appraisal. Thereafter, the Ministry of Environment, Forests and Climate Change (MoEF & CC) vide notification dated 25.07.2018 provided the procedure for the preparation of the District Survey Document. Accordingly, the survey report for district Shimla has been updated. This District Survey Report has been updated by covering the mineral-bearing areas and overviews of mining activities in the district with all the relevant features pertaining to geology and mineral wealth in replenish-able and non-replenish-able areas of rivers, streams and other sources. The mineral potential has been calculated based on field investigations taking into consideration the geology of the catchment area of the river/streams and other sources.

The District Survey Report (DSR) of District Shimla comprises secondary data on geology, mineral resources, climate, topography, landform, forest, rivers, soil, agriculture, road, transportation, irrigation etc of the district collected from various published and

unpublished literature and reports as well as various websites. The data of deposition or replenishment, the distance of deposits from the river banks, chances of erosion and other geomorphological features of rivers may vary due to floods, heavy rains and other natural calamities.

2. Overview Of Mining Activity In The District

Himachal Pradesh is situated in the western Himalayas covering an area of 55,673 kilometres (34,594 mi). Himachal Pradesh is almost wholly mountainous with altitudes ranging from 350 meters to 6,975 meters above the mean sea level. It is located between Latitude 30º22'40"N to 33º12'20"N and Longitude 75º45'55" E to 79º04'20" E. It has a deeply dissected topography, complex geological structure and a rich temperate flora in the sub-tropical latitudes. The drainage system of Himachal is composed both of rivers and glaciers. Himalayan rivers criss cross the entire mountain chain. Himachal Pradesh provides water to both the Indus and Ganges basins. The drainage systems of the region are the Chandra Bhaga or the Chenab, the Ravi, the Beas, the Sutlej and the Yamuna. These rivers are perennial and are fed by snow and rainfall. They are protected by an extensive cover of natural vegetation. Due to extreme variation in elevation, there is great variation in the climatic conditions of Himachal. The climate varies from hot and sub-humid tropical in the southern tracts to, with more elevation, cold, alpine and glacial in the northern and eastern mountain ranges. The state has areas like Dharamsala that receive very heavy rainfall, as well as those like Lahaul and Spiti that are cold and almost rainless.

Shimla district forms a part of southern Himachal Pradesh. The district lies between the longitudes 77°0' and 78°19' east and latitudes 30º45' and31°44' north and is bounded by Mandi and Kullu district in the north, Kinnaur in the east, the state of Uttaranchal and Sirmaur district in the south and by Solan district in the west. The shape of the district is somewhat rectangular with slight bulges on the western side intruding towards Solan district and on the northern side towards Kullu district. The district has an area of 5,131 Sq. kms. out of the total area of 55,673 Sq. kms.of Himachal Pradesh according to the Surveyor General of India.

Mainly three types of minor mineral constituents such as sand, stone and bajri are required for any type of construction apart from other materials like cement and steel. In earlier times, the houses/ buildings were constructed in the form of small dwellings with walls made up of mud plaster, stone and interlocking provided with wooden frames and there were negligible commercial as well as developmental activities resulting in less demand for building materials. However, with time, new vistas of developmental activities were started. In district

Shimla, there is a boom in construction activities especially in roads and Hotel industries, as such the demand for minor minerals in the District started to increase trend.

The minor minerals available in the district are Boulder, Bajri (Gravels), Sand, Clay etc. from the river bed as well as Slate and Rough Stone, Project Stone, and Terrace mineral deposits from the hill slope. However, there are no major mineral industrial enterprises that can be set up in the district. Other minerals like semi-precious stones, Beryl-bearing pegmatites, China clay, Garnet crystals, Bands of haematite-quartzite etc. are also present in very small quantities which are not of much economic value.

The Shimla district does not have any large mines. At present, the Collection of in-situ stone from the hilly terrain is the main minor mineral source. These materials are primarily utilized for construction purposes. In order to meet the requirement of raw construction materials, the extraction of stone is being carried out exclusively from the Hill slopes. The demand for sand and grit is mainly met by the broken rock material from the hill slope which is manufactured by stone crushers. The local residents used to lift gravel etc. from the river beds to meet their bonafide requirement, however after coming into the Himachal Pradesh Minor Minerals (Concession) Rules 1971 Repealed as Himachal Pradesh Minor Minerals (Concession) and Minerals (Prevention of illegal Mining, Storage and Transportation) Rules 2015, the mining is regulated.

The minor mineral from the Riverbed and its tributaries as well as from the Hill slope are also granted through the concessions for the exploitation of minor minerals by tender cum e-auction method for specific quantities and periods in the district. The contract period of auction/tender is up to 15 years in the case of forest land and the auctioned land is granted for extraction of minor minerals only after completing all the codal formalities.

3. List Of Granted Mining Leases/Auctioned Areas In The District With Location, Area And Period Of Validity

At present about 51 Nos of mining leases (Pvt./Govt. Land) have been granted/executed and are under operation and the demand for furnished material is still high.

Table 1: The details of the Mining lease are as follows:

Sr. No.	Name and Address of Mining Lease Holder	Khasra No./Location in Mauza/Mohal	Area (Hectares/Bighas	Lease Period	Coordinates	
1.	Pramod Kumar S/o Mansa Ram, Vill. Naggar, Teh. Sunni, Distt. Shimla	688, 689, 690, 691 & 693/2 &693/3(Naggar/ Sunni)	(0-68-93 Hect.)	04.11.2020 to 03.11.2025	31°13'34" N	77°03'36" E
2.	Pramod Kumar S/o Mansa Ram, Vill. Naggar, Teh. Sunni, Distt. Shimla	11/5/2 & 12/5(Than / Sunni)	(00-98-21 Hect.)	24.11.2021 to 23.11.2031	31°14'2" N	77°03'36" E
3.	Vipin Sharma, V.P.O. Chaba, Teh. Sunni, Distt. Shimla	1244, 1246, 1247, 1248, 1249 & 1250/(Dargi/Sunni)	(1-62-35 Hect.)	01.05.2015 to 30.04.2030	31°13'47.57" N	77°02'59.01" E
4.	M/s Suman enterprises Suman Cottage Sanjauli, Teh. & Distt. Shimla HP	467/2/(Sargatta/Junga)	(1-72-58 Hect)	17.09.2021 to 16.09.2031	31°00'17.9" N	77°15'36.00" E
5.	Vinod Shandil Kawalag Majhar	654/2, 655, 664, 666, 667, 668/2 & 672/2(Kawalag Mazhar/Shimla)	(01-35-36 hect))	08.04.2022 to 08.04.2037	31°02'31.68" N	77°11'21.61" E
6.	M/s Sharma Stone Crusher, Prop. Manish Mohan Sharma VPO Salana,	1042, 998, 1029 & 1041/(Salana/Shimla)	(1.0166 hect))	28.07.2015 to 27.07.2030	31°02'41.4" N	77°05'44" E

	Tehsil & Distt. Shimla.					
7.	Ashok Thakur S/o Narayan Singh R/o Village Thund(Panjoli) P.O. Satlai Sub-Tehsil Junga Shimla (H.P.)	514/1(Thund (Panjholi)/ Junga)	(01-36-55 Hect.)	24.11.2015 to 23.11.2030	30°59'54.64" N	77°16'12.63" E
8.	Satya Prakash R/o Vill Mandar PO Baldeyan Tehsil and Distt Shimla H. P.	190/(Mandar/Shimla)	(0-90-83 Hect.)	15.08.2016 to 14.08.2026	31°11'53.38" N	77°11'43.39" E
9.	Manish Mahendra Village Panahel Tehsil Sunni, District Shimla HP	777/447 & 778/447(Panehal/Sunni)	(0-44-83 Hect.)	24.07.2019 to 23.07.2024	31°11'37.33" N	77°10'1.58" E
10.	Ishwar Rohal, S/o Ram Krishan Rohal, Village Garo, P.O. Shoghi, Tehsil & Distt. Shimla H.P.	4/10/2 (Tikkari/Shimla)	(0-57-98 Hect.)	10.07.2020 to 09.07.2030	31°10'12.079 " N	77°06'22.08" E
11.	Smt. Kamla Devi W/o Lt. Sansar Chand Sahani, R/o Kamla Niwas, Near Dhalli Tunnel, Shimla HP	6/3 (Than/Sunni)	(0-58-32 Hect.)	20.02.2020 to 19.02.2025	S31°14'2" N	77°3'58" E
12.	Smt. Shakuntla Devi W/o Hira Singh, village Dido, P.O. Dev Nagar, Tehsil & Distt. Shimla HP	621/2 & 622/2 (Tikkari/Shimla)	(0-30-76 Hect.)	27.07.2021 to 27.07.2026	31°09'44.95" N	77°07'1.15" E
13.	Smt. Kavita Thakur, R/o Vill. Kanog, P.O. Bhararia, Tehsil & Distt. Shimla HP	423/2 & 425/1 (Tikkari/Shimla)	(00-52-68 Hect.)	05.04.2023 to 04.04.2028	31°2’26.50” N 31°2’27.18” N 31°2’28.57” N	77°16’48.98” E 77°16’49.87” E 77°16’52.22” E

					31°2’27.59” N 31°2’26.18” N 31°2’25.71” N	77°16’53.94” E 77°16’51.65” E 77°16’51.12” E
14.	Diwakar Dutt Sharma, S/o Bija Ram, R/o Vill. & P.O. Devnagar (Moolbari), Tehsil & Distt. Shimla HP	416 (Moolbari /Shimla)	(01-12-81 Hect.)	06.09.2023 to 05.09.2028	31°9’30.51” N 31°9’31.46” N 31°9’31.79” N 31°9’30.90” N 31°9’30.50” N 31°9’29.31” N 31°9’30.90” N 31°9’29.86” N	77°6’18.97” E 77°6’18.83” E 77°6’23.48” E 77°6’23.945” E 77°6’23.98” E 77°6’24.01” E 77°6’22.30” E 77°6’20.04” E
15.	M/s Shri Ram Stone Crusher, (Partners S/Shri Saurah Bassi, Bir Singh, Mohamad Rafi & Smt. Veena Devi), Vill. Nadukhar, P.O. Basantpur, Tehsil Sunni, Distt. Shimla HP	515/2, 517 & 935 (Nadukhar/Sunni Shimla)	(00-80-12 Hect.)	09.08.2023 to 08.08.2033	31°12’46.80” N 31°12’45.60” N 31°12’44.30” N 31°12’42.81” N 31°12’41.49” N	77°09’16.30” E 77°09’19.22” E 77°09’20.54” E 77°09’22.23” E 77°09’16.55” E
16.	M/s JDD Kalta Bros. and Associates	621/2 & 622/2 (Tikkari/Shimla)	(0-30-76 Hect.)	28.05.2009 to 27.05.2024	31°11'10.84" N	77°28'49.82" E
17.	Narender Kumar Justa, Vill. Chamera, P.O. Rawla Kair Teh. Kotkhai	423/2 & 425/1 (Tikkari/Shimla)	(00-52-68 Hect.)	26.10.2023 to 25.10.2028	31°09'30.76" N	77°30'22.44" E
18.	Dixit Kaparate, VPO Purag Teh.Kotkhai, Distt. Shimla	416 (Moolbari /Shimla)	(01-12-81 Hect.)	21.06.2023 to 20.06.2033	31°06'12.88" N	77°25'50.08" E
19.	Yogesh Kumar Sood VPO Mohri, Teh. Theog	515/2, 517 & 935 (Nadukha	(00-80-12 Hect.)	02.08.2023 to 01.08.2038	31° 09'13.81" N	77°25'12.07" E

		r/Sunni Shimla)				
20.	Yogesh Kumar Sood VPO Mohri, Teh. Theog	621/2 & 622/2 (Tikkari/Shimla)	(0-30-76 Hect.)	21.03.2023 to 20.03.2028	31° 08'21.78" N	77°24'44.42" E
21.	Sandeep Thakur S/o Kewal Ram, Vill. Talli, P.O. Chanair, Teh. Theog, Shimla	335/2/(Tikkar/Theog)	(0-59-61 Hect.)	21.05.2015 to 20.05.2025	31°04'1.87" N	77°25'30.48" E
22.	Bharat Bhushan Verma VPO Sainj Teh. Theog Distt Shimla H.P	66, 69, 70, 71 & 72/(Tihana/Theog)	(01-43-24 Hect.)	07.07.2023 to 06.07.2033	31°03'36.48" N	77°25'10.84" E
23.	Bhinder Singh Verma Prop. M/s Verma Stone Crusher Village Gajeri P.O. Jais, Tehisl Theog Distt. Shimla	388/363 & 365	(00-79-69 Hect.)	30.04.2016 to 29.04.2026	31°06'23.86" N	77°23'25.90" E
24.	Suresh Chauhan S/o Lt. Jai Ram, Village Kathori, P.O. Deha, Tehsil Chopal, Distt. Shimla HP	48 & 35/(Pundar/Theog)	(01-11-24 Hect.)	09.08.2023 to 08.08.2033	31°02'0.56" N	77°25'17.77" E
25.	Keshav Ram Village Kanufari, PO Dharech, Tehsil Theog Distt. Shimla HP	337/1 & 336/(Dharech/Theog)	(00-57-32 Hect.)	06.01.2017 to 05.01.2027	31°01'33.36" N	77°19'21.90" E
26.	Vikram Kanwar, Vill. Khaltunala, PO Rawlakiar Tehsil Kotkhai Shimla	364/2/(Kolvi/Kotkhai)	(01-15-67 Hect.)	17.03.2018 to 16.03.2033	31°10'8.11" N	77°30'20.20" E
27.	Devraj Verma R/o Balson House Khalini Tehsil and Distt Shimla H.P	698/2 and 704/2(Balghar Katyana-II)	(01-12-14 Hect.)	15.02.2023 to 14.02.2028	31°03'49.1"N	77°25'37.0"E

28.	Jagdish Chand Verma, S/o Late Ratti Ram, Vill. Tihana, Sub-Tehsil Deha Distt. Shimla HP	220 (Tihana/Theog)	(01-12-87 Hect.)	27.07.2023 to 26.07.2033	31°03’37.1” N 31°03’36.4” N 31°03’37.5” N 31°03’39.4” N 31°03’35.37” N 31°03’36.00” N	77°26'42.9"E 77°26'41.6"E 77°26'43.1"E 77°26'39.2"E 77°26'38.33" E 77°26'41.6"E
29.	Rajinder Verma S/o Matha Ram, R/o Vill. & P.O. Sarion, Tehsil Theog Distt. Shimla HP	313/3 (Jhakri/Theog)	(00-35-70 Hect.)	23.12.2023 to 22.12.2028	31°7’52.03” N 31°7’53.73” N 31°7’54.00” N 31°7’54.72” N 31°7’52.58” N	77°23’14.04” E 77°23’12.60” E 77°23’13.13” E 77°23’14.40” E 77°23’15.23” E
30.	Ajay Rathore S/o Ishwar Singh Rathore, Vill. Kiri, P.O. & Tehsil Nerwa, Distt. Shimla HP	522/2 (Chhachar /Nerwa Chopal)	(0-67-80 Hect.)	06.01.2018 to 05.01.2028	30°58'13.01' N	77°40'55.06" E
31.	Uday Singh Kanwar S/o Birender Singh, Village Makrandli PO Kedi Tehsil Chopal Distt. Shimla HP	88/(Mukhraldi/Chopal)	(1-64-24 Hect.)	04.11.2020 to 03.11.2030	30°53'06.21" N	77°40'30.63" E
32.	M/s O.P. Mehta V.P.O. Khaneri, Teh. Rampur, Distt. Shimla	493/480/33, 109/15, 115/110/15, 117/113/21 & 111/21 /(Pashada/ Rampur)	(1-10-78 Hect)	4.02.2012 to 3.02.2027	31°28'25.37" N	77°40'56.31" E
33.	M/s O.P. Mehta V.P.O. Khaneri, Teh. Rampur, Distt. Shimla	493/480/33, 109/15, 115/110/15, 117/113/21 &	(1-10-78 Hect)	17.06.2015 to 16.06.2030	31°28'25.37" N	77°40'56.31" E

		111/21 /(Pashada/ Rampur)				
34.	Subhash Chand Vij, Vill. Daro, P.O. Narkanda, Teh. Kumarsain, Distt. Shimla H. P.	64/2 & 65/2/(Dharo/Kumarsain)	(0-45-90 Hect.)	13.05.2015 to 12.05.2025 (10 years)	31°14'50.04" N	77°29'2.09" E
35.	Sachin Sood, M/s Himalyan Stone Crusher, Prop. Rampur Bsr.	215/1(Jubya Sanathli/Rampur)	(0-93-00 Hect.)	01.07.2015 to 30.06.2030 (15 years)	31°26'35.17" N	77°39'22.028" E
36.	Kanwar Singh Jistu S/o Lal Chand, Vill. Thana-Jubbar, P.O. Fagu, Teh. Theog, Distt. Shimla 94180-71558 98167-62403	527, 528, 549, 550 & 551(Badogi/Kumarsain)	(00-92-50 Hect.)	12.03.2009 to 11.03.2024	31°20'05" N	77°20'15" E
37.	Yashwinder Singh Vill. Nirsu, P.O. Duttnagar Tehsil Rampur	5(5/1, 5/2), 7, 8, 9, 10, 13 & 14(Charutha/Kumarsain)	(1-97-67 Hect.)	07.06.2016 to 06.06.2026	31°22'44.61" N	77°32'54.42" E
38.	Yashwinder Singh Vill. Nirsu, P.O. Duttnagar Tehsil Rampur	1838, 1839, 1840 & 1841 (Nirath/Rampur)	(01-53-62 Hect.)	17.08.2016 to 16.08.2026	31°22'1.3" N	77°32'43.2" E
39.	Rajender Kumar Kashmir House Rampur Bsr. Distt. Shimla	1995/1/1(Jhakri/Rampur)	(0-98-70 Hect.)	12.10.2017 to 11.10.2032	31°29'2.91" N	77°41'23.67" E
40.	M/s M.G. Mehta & Associates Village Sainj, PO Kirti, Tehsil Kumarsain Distt. Shimla HP	31, 32, 280/33/2, 34, 36, 37, 38, 282/39 & 284/42(Chamod/Kumarsain)	(04-64-99 Hect.)	09.03.2018 to 08.03.2028	31°20'6.28" N	77°20'44.33" E

41.	Sanjeev Mehta S/o Sardari Lal Mehta Prop. M/s Satya Surya Shiv Stone Crusher Stone Crusher Vill. Suild PO Thanadhar Tehsil Rampur Distt. Shimla	494/480/33/3 & 477/33/3(Pashada/Rampur)	(0-82-02 Hect.)	16.03.2018 15.03.2028	31°28'7.90" N	77°40'40.4" E
42.	Smt. Veena Thakur W/o Gulab Singh Thakur Village Nirsu P.O. Duttnagar Tehsil Rampur	176/2(Jhunjan/Kumarsain)	(0-49-11 Hect.)	23.04.2018 to 22.04.2028	31°17'14" N	77°19'32.32" E
43.	Suresh Kumar, Village Chafa, P.O. Bharari Tehsil Kumarsain Shimla	130/2 and 124	(0-24-68 Hect.)	31.07.2021 to 30.07.2026	31°21'11.9" N	77°24'29.5" E
44.	Dalip Singh S/o Taradutt R.o Vill Mayog P.O Kamlanagar Tehsil and Distt Shimla H.P	34, 2307/38 (Duttnagar/Rampur)	(00-48-62 Hect.)	12.12.2022to 21.12.2027	31°23'40.6"N	77°34'36.2"E
45.	Amit Dogra R/o Vill Mahavali Tehsil Kumarsain Distt Shimla H.P	69	(0-24-11 Hect.)	14.12.2022 to 13.12.2027	31°21'32.1"N	77°22'55.7"E
46.	Sunder Lal, R/o Vill. Parashan, P.O. Luhri, Tehsil Kumarsain, Distt. Shimla H.P.	250/2 (Parashan/ Kumarsain)	(00-67-63 Hect.)	13.03.2024 to 12.03.2029	31°21’5.65” N 31°21’5.43” N 31°21’4.94” N 31°21’3.85” N 31°21’3.34” N 31°21’2.28” N 31°21’1.72” N 31°21’1.28” N	77°24’33.08” E 77°24’32.98” E 77°24’31.75” E 77°24’32.38” E 77°24’30.75” E 77°24’31.97” E 77°24’32.06” E 77°24’33.13” E

					31°21’2.17” N	77°24’33.04” E
47.	Ajay Sauhta, S/o Vijay Singh Sauhta VPO Dhar, Teh. Jubbal, Distt. Shimla	172/1(Mungra Nadhal/Jubbal)	(0-84-72 Hect.)	04.06.2015 to 03.06.2030	31°03'31.94" N	77°41'21.29" E
48.	Virender Banshtu Vill. Dalgoan, P.O. Kutara, Teh. Rohru, Distt. Shimla	1694/2/1/2(Rantari/Rohru)	(0-71-20 Hect.)	16.02.2009 to 15.02.2024	31°12'54.65" N	77°46'48.38" E
49.	Jai Chauhan PO Hatkoti Tehsil Jubbal Distt. Shimla HP	1104/1(Karasa/Rohru)	(0-67-28 Hect.)	22.12.2017 to 21.12.2032	31°09'29.97" N	77°44'8.61"E
50.	Surinder Dutta, Dutta Complex, Main Bus Stand, Rohru Distt. Shimla HP	280/2(Kuttu/Rohru)	(01-63-72 Hect.)	07.08.2019 to 06.08.2029	31°13'29.2"N	77°45'28.35" E
51.	The Additional General Manager (Geotechnical/ QC), M/s Satluj Jal Vidyut Nigam Ltd., Luhri Hydro Electric Project, Shakti Sadan, Corporate Office, SJVNL Complex, Shanan, Distt. Shimla HP	360/1 & 536/363/1 (Khaira/Sunni)	(10-15-29 Hect.)	22.02.2024 to 21.02.2029	31°14’55.6” N 31°14’54.9” N 31°14’49.8” N 31°14’44.6” N 31°14’46.8” N 31°14’48.1” N	77°12’47.0” E 77°12’49.0” E 77°12’54.1” E 77°12’55.6” E 77°12’37.6” E 77°12’35.6” E

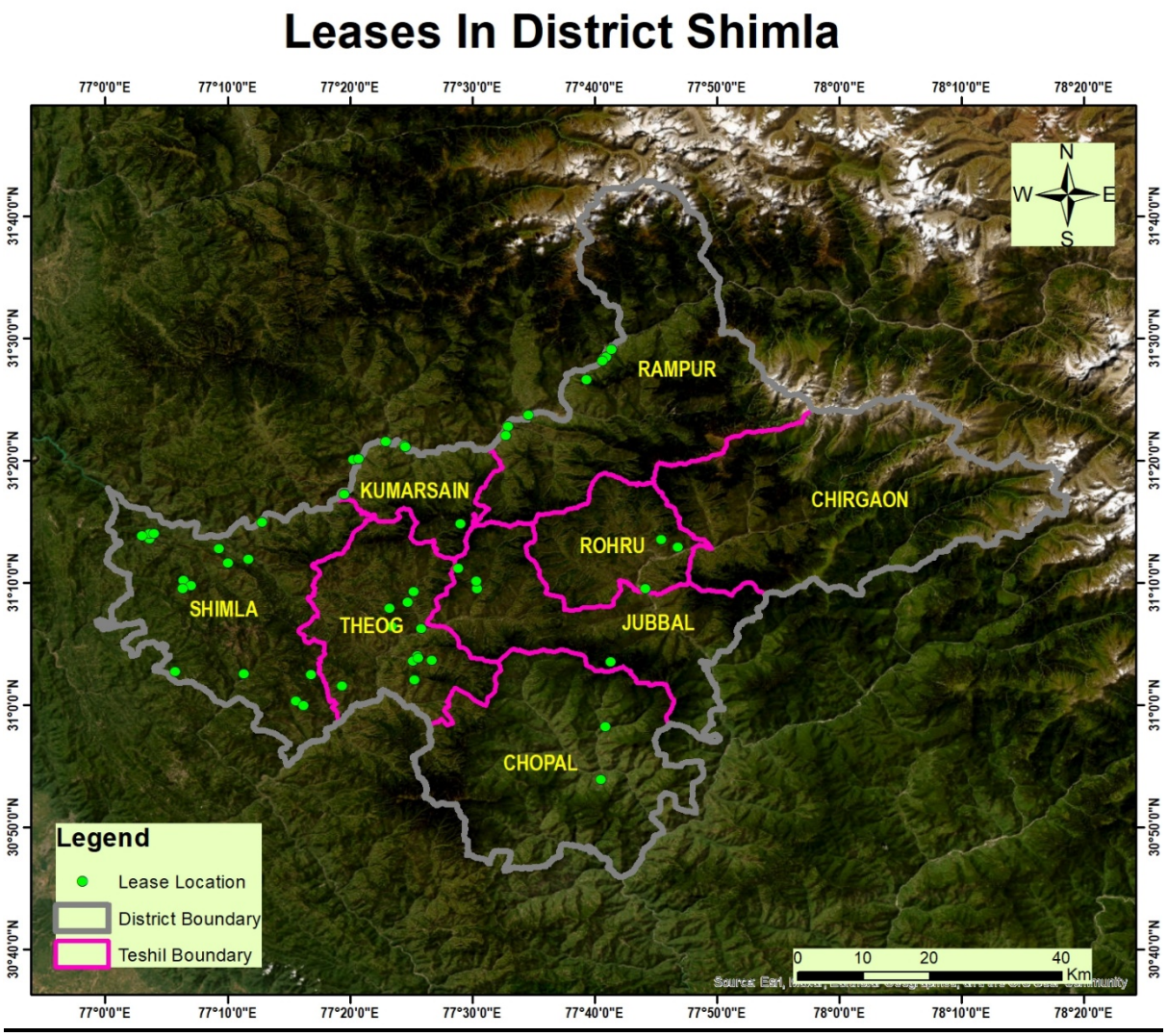


Image showing the location of the mining leases

4. Details Of Royalty Or Revenue Received In The Last Four Years

Table 2: Detail of Revenue Collected by Mining Office Shimla H.P. in Last 04 Years

Sr. No.	Financial Year	Revenue collected Offline (In Rs)	Revenue Collected Online (In Rs)	Total Revenue Collected (In Rs)
1	2020-21	59303956	10417020	69720976/-
2	2021-22	5842000	25481580	31323580/-
3	2022-23	26396206	47766900	74163106/-
4	2023-24	20892558	80747788	101640346/-

5. Detail Of Production Of Minor Mineral In Last Three Years:

Table 3: Production of Minor Mineral in Metric Tonnes

FY	2020-21	2021-22	2022-23	2023-24
Sand	153823	18069	2600	15760
Stone	341869	107855	101252	689930
Bajri	499747	322649	221040	305558

6. Detail Of Letter of Intent

It is submitted that the department grant's mineral concessions by two modes, one through auction and another through mining leases. In both cases, as per the provisions contained in the Himachal Pradesh Minor Minerals (Concession) and Minerals (Prevention of Illegal Mining, Transportation and Storage) Rules, 2015, the areas are inspected by the Joint Inspection Committee under the Chairmanship of SDO (Civil) concerned comprising members from other department like Irrigation & Public health, State Pollution Control Board, Forest Department, HP Public Works Department, Geologist or Mining Officer and as such, the letter of intents are issued only after recommendations of the Joint Inspection Committee which is continuous process.

The applicant has to complete the codal formalities like preparation of mining plan and has to obtain environment clearance before the grant of mineral concession. As such, it is an ongoing process and as soon as the clearances are obtained, the letters of intents are converted into mining lease. Also, if the letter of intent holder is unable to obtain the required statutory clearances within the validity period of letter of intent, the period is accordingly extended so as to enable the letter of intent holder to obtain the required clearances. Hence, as such it shall not be possible to provide the exact details of the letter of intents in this survey document as these keeps on changing on day to day basis.

7. Process Of Deposition Of Sediments In The Rivers Of The District

Many rivers originate from the Himalayan and Shivalik regions which supply water in down streams. The greatest sediment yields are generally associated with rivers draining areas of intensive tectonic activity therefore, Himalayan rivers cause tremendous erosion and carry large amounts of sediment. The sediment load of a river is commonly considered to be a pollutant that is aesthetically displeasing and environmentally degrading. Sediment load can

be divided into bed load and suspended load based on the mode of transport. Bed load is transported close to the bed where particles move by rolling, sliding, or jumping transport in natural rivers is a complicated phenomenon. Its movement is quite uneven in both the transverse and longitudinal directions, which varies considerably. Some sediment particles roll or slide along the bed intermittently and some others saltate (hopping or bouncing along the bed).

The material transported in one or both of these modes is called 'bed load'. Finer particles (with low fall velocities) are entrained in suspension by the fluid turbulence and transported along the channel in suspension. This mode of transport is called 'suspended load'. Sometimes finer particles from upland catchment (sizes which are not present in the bed material), called 'wash load', are also transported in suspension. The combined bed material and wash .load is called 'total load'. Bed load ranges from a few percent of the total load in lowland rivers to perhaps 15% in Mountain Rivers to over 60% in some arid catchments. Although a relatively small part of the total sediment load, the arrangement of bed load sediment constitutes the architecture of sand bed and gravel-bed channels. The rate of sediment transport typically increases as a power function of flow; that is, a doubling of flow typically produces more than a doubling in sediment transport and most sediment transport occur during floods.

Rivers can be called open as well as underground circulatory systems of a continent and in the case of the Shimla district of Himachal Pradesh River Satluj and River Giri are the main aortae which are the main conduits for carrying water, minerals and load to nurture and to shape the life and the land. History has shown us that rivers have provided us with drinking water, agricultural lands, building materials, means of transportation and a habitable ecosystem. In northern India, the main drinking water source direct or indirect comes from rivers only but as human activities are profoundly increased a systematic and scientific utilization of the system is very important.

Natural processes shape the land by various means i.e. fluvial, erosional and Aeolian are slow and steady but any slight change to these processes can imbalance the process and resultant is the catastrophe. Deforestation, industrialization, urbanization, floodplain cultivation, dam and levee construction, and channelization have altered dramatically natural flow regimes. These changes have contributed to flooding, erosion, channel incision, contamination, non-native species introductions, and loss in ecological diversity. Although well-organised techniques to harvest natural resources can sustain the changes still slow and steady.

The multiple and sometimes incompatible services we demand from rivers often lead to social conflicts. The policy and management decisions that surround these conflicts increasingly require the integration of science-based information that crosses traditional disciplines. Unfortunately, gaps in our understanding of river processes often limit our ability to manage rivers optimally.

7.1 River Science

River Science is the study of processes affecting the river system. River science integrates multiple disciplines; it includes the study of how hydrological, geological, chemical, and ecological processes interact to influence the form and dynamics of riverine ecosystems and how riverine ecosystems in turn influence these processes across multiple spatial and temporal scales.

River science seeks to understand the linkages between river-related processes and patterns at multiple scales, from small streams to large rivers, from pristine to heavily urbanized watersheds, and from daily- to century-scale dynamics. Watersheds range in size from under one to thousands of square kilometres, and a river's physical and biological environment changes as water moves downstream. Small-scale or short-term physical processes may influence reach-scale habitat features that in turn influence ecological processes at broader scales and over longer periods. River science includes the study of relationships between watersheds, riparian zones, floodplains, groundwater, headwaters and downstream Rivers. Thus, river science is not constrained by any arbitrary spatial scale or physical boundaries defined by the morphology of channels, floodplains, or terraces. Rather, its domain and bounds are defined by the scales necessary to understand and predict river processes.

7.2 Major Rivers of Shimla District

The Giri and Satluj rivers form the major drainage system in the district. The river Satluj and its tributaries, drain about 35% of the district area in the northern part of the district, whereas the southeren part is drained by the Giri River, Pabbar River, Shalvi Khad and Tons River these joint form Giri Catchment and drains 65 % of the total area of the district.

7.2.1 Satluj River

Satluj or Sutlej river rises from beyond Indian borders on the Southern slopes of the Kailash mountain near Mansarover lake from Rakas lake, as Longcchen Khabab river (in Tibet). It is the largest among the five rivers of Himachal Pradesh. It enters Himachal at Shipki (altitude = 6,608 metres) and flows in the South-Westerly direction through Kinnaur, Shimla,

Kullu, Solan, Mandi and Bilaspur districts. Its course in Himachal Pradesh is 320 km. from Rakastal, with famous tributaries viz. the Spiti, the Ropa, the Taiti, the Kashang, the Mulgaon, the Yula, the Wanger, the Throng and the Rupi as right bank tributaries, whereas the Tirung, the Gayathing, the Baspa, the Duling and the Soldang are left bank tributaries. It leaves Himachal Pradesh to enter the plains of Punjab at Bhakhra, where the world's highest gravity dam has been constructed on this river. Its total catchment area in Himachal Pradesh is 20,000 sq. km. The river Satluj forms the southern boundary and separates it from the Shimla and Solan districts. The river Satluj enters in the Shimla district near the Jhakri near the Rampur area and flows towards the south-west direction. It leaves the district near Dehar and enters into the Bilaspur district, Behna, Ropri Bagri, Chanod and Alsed are the important streams that fall into the Satluj from the Northern direction of the district.

Table 4: The key characteristic of the Satluj River are described below

Name of the River	**Length(in km)**	**Catchment Area (in Sq.km)**	**Average Width(in mtrs.)**
Satluj River	90 Km.	2000 Sq. Kmtrs.	60 mtrs.
Origin of Satluj River	From base of Kailash Mountain near Mansarovar / Rakas Lake at an altitude of about 5000-meter above mean sea level. It enters in to Shimla District near village Phagi andWadhal at an altitude of 1235 mtrs. roughly		
Important tributaries of the catchment.	Kut Khad, Ratu Gad, Gatti Gad, Ganvi Khad, Rai Khad, Manglad Khad, Barauni Khad, Kajo Khad, Banavali Khad, Jakho Khad, Sumun Khad, Nogli Khad, Kurpan Khad, Kyali Khad, Machhad Khad, Bhera Khad, Khaneti Khad, Beha Khad, Kingal Ki Khad, Kunda Nala, Pandoa Khad, Nauti Khad etc.		

Geological Conditions:

Geo-morphologically the Satluj River flows through high mountainous terrain to moderate low hills and intervening valleys of the different type of rocks. On entering Himachal Pradesh at Shipki-la-the Satluj River is joined by its principal tributary Spiti River which is fed by the Pin, Lingti and other smaller streams at Namgya. Downstream Kalpa in Kinnaur, it is joined by the Baspa river. It crosses the Great Himalaya range near Kalpa and at Rampur it crosses the Rocks of Rampur formation. The whole river stretch is represented by admixture or Boulders, Cobbles, Pebbles and Sand. The competency of the river is much higher especially

during rainy season. The carrying capacity of Satluj River is much higher which may lead to 5 to 10 cms of annual deposition.

Total Potential of Satluj River:

On the basis of drainage analysis, No. of tributaries, average erosion in the river bed, the annual deposition of minor mineral in the river bed has been calculated by taking into consideration the annual deposition of about 6 Cms.

Table 5: The total potential of the Satluj River is given below

Name of River	Boulder (in Metric Tonnes)	Bajri (in Metric Tonnes)	Sand (in Metric Tonnes)	Total (in Metric Tonnes)
Satluj River	29,03,040	21,77,280	21,77,280	72,57,600
Annual Replenishment				
	1,74,182	1,30,637	1,30,637	4,35,456

Recommendations:

It is evident from the above table that about 72,57,600 metric tons of different sizes of minor minerals are available upto depth of one meter in the river bed of Satluj River in Shimla District. Similarly, the annual deposition of minor mineral in the river bed is calculated approximately to the tune of 4,35,456 metric tons. It is therefore recommended that mineral concession can be granted in the river bed of Satluj River from downstream of Wadhal up to near Kiarl i.e. last boundary where the Satluj river leaves Shimla District after leaving the safe distances/buffer zone from the Hydro Electric Projects, I&PH schemes and other points of public community Projects.

7.2.2 Pabbar River

The Pabbar River rises from the base of Chander Nahan peak in between Sangla Tehsil of Kinnaur District and Rohru Tehsil of Shimla District at an altitude of 3200 mtrs. roughly. The river takes South-Eastern course and passes through Tehsil Chirgoan, Rohru, Jubbal and merge with the river Tons at Tiuni in Uttrakhand. The river receives the entire drainage in these threeTehsils and is fed by Shikri, Andra, and Hatkoti etc. Stream/Khads. All these stream/khads are also perennial. The Pabbar river delivers a substantial amount of sediment load in the form of sand, stone and river borne bajri particularly during snowmelt and flood seasons. Pabbar River in Himachal Pradesh covers a catchment area of approximately 1200 Sq. km., out of which 42% is above EL.2000 m and it is mostly snow bound. The total length of river in District

Shimla Himachal Pradesh is about 67 km. In the upper regions, mostly the area is sparsely populated, because of the steep mountain ranges, remote location and in accessibility. The river flows in a south westerly direction down to Rohru Township, there it turns to southeasterly direction. About 20 km south east of Jubbal, it leaves Himachal Pradesh territory and enters Uttarakhand.

The carrying capacity of the Pabbar river is good enough as different khad/Nallah joins the river at different spots. Two major khads i.e. Andra khad and Gumma khad joins the river at Chirgaon and both the tributaries having a good carrying capacity of annual deposition of sediments like stone & sand in river bed.

Table 6: The key characteristic of the Pabbar River and its major tributaries

Name of the River	**Length (in km)**	**Catchment Area (in Sq.km)**	**Average Width(in mtrs.)**
Pabbar River	67 Km.	1200 Sq. Km.	60 mtrs.
Origin of Pabbar River	From base of Chander Nahan peak, 3200 Meter above MeanSea Level.		
Important tributaries of the catchment.	Khanyara Khad(Right Bank Tributary), Gumlati khad(left Bank Tributary, Andra khad (Right Bank Tributary), Peja khad (left Bank Tributary), Masrat khad (Right Bank Tributary), Pakhal khad (left Bank Tributary), Shikdi khad (Right Bank Tributary), Dhar khad (left Bank Tributary), Dogra khad (Right Bank Tributary), Bishalti Nala (Right Bank Tributary), Ramwikhad (left Bank Tributary), Salanti khad, (Right Bank Tributary), Kunu khad (Right Bank Tributary), Nalia khad(Right Bank Tributary), Occha khad (Right Bank Tributary) etc.		
Name of the River	**Length (in km)**	**Catchment Area (in Sq.km)**	**Average Width(in mtrs.)**
Pabbar River	67 Km.	1200 Sq. Km.	60 mtrs.

Origin of Pabbar River	From base of Chander Nahan peak, 3200 Meter above MeanSea Level.
Important tributaries of the catchment.	Khanyara Khad(Right Bank Tributary), Gumlati khad(left Bank Tributary, Andra khad (Right Bank Tributary), Peja khad (left Bank Tributary), Masrat khad (Right Bank Tributary), Pakhal khad (left Bank Tributary), Shikdi khad (Right Bank Tributary), Dhar khad (left Bank Tributary), Dogra khad (RightBank Tributary), Bishalti Nala (Right Bank Tributary), Ramwikhad (left Bank Tributary), Salanti khad, (Right Bank Tributary), Kunu khad (Right Bank Tributary), Nalia khad(Right Bank Tributary), Occha khad (Right Bank Tributary) etc.

Geological Conditions:

The Pabbar River in most of its course flows through high mountainous terrain to moderate low hills and intervening valleys of the Jutogh Group of rocks. The carrying capacity of the said river is good enough as different khad Nallah joins the river at different spots. Two major khads i.e. Andra khad and Gumma khad joins the river at Chirgaon and both the tributaries having a good carrying capacity. It is also important to mention here that the track of Pabbar River is very long and this river is the only source of sand and other building material in the area. As such Department of Industries, Geological Wing, Himachal Pradesh used to auction the Pabbar River till March, 2003. However, no auction could done, thereafter due to applicability of Forest Department, Notification dated 15/1/1952 and 25/2/1952, wherein all the waste land in the ownership of Govt. has been declared as Forest land and thus attracted the provision of FCA, 1980. This resulted in to scarceness/shortage of minor mineral in the area which further cause the illegal mining in the river bed. Keeping in consideration of unscientific and excessive mining in Pabbar river, the Govt. vide Notification dated 21.02.2004 imposed a complete ban on excavation/collection of sand, stone and bajri from the catchment of Pabbar River and its tributaries, right from its origin and up to its confluence with the Tons river at the border of Himachal Pradesh near Tiuni (Uttarakhand). However, the Government again partially modified the earlier notification of dated 21.02.2004 and vide fresh Notification No. Udyog-ll(Chh)5-27/92-l, dated 16.08.2004 allowed excavation collection of sand stone and bajri in certain parts of Pabbar river and its tributaries in certain selected area i.e. Andra Khad, Badyara-Seema portion, Kuddu-Snail portion, Bachhan Nala, Bijauri area and Tikkari

area subject to general conditions of River/Stream Bed Mining Policy Guidelines-2004 but no mineral concession has been applied by anyone even in the selected allowed areas for mining due to the applicability of Forest Conservation Act. However, on the basis catchment area, annual deposition and other various factors, the potential of Pabbar river for granting mineral concession have been again studied in detail.

Total Potential of Pabbar River:

On the basis of drainage analysis, no. of tributaries, average erosion in the river bed, the annual deposition of minor mineral in the river bed has been calculated by taking into consideration the annual deposition of about 5 Cm. The total potential of the Pabbar River is given below in the table:

Table 7: Total Potential of Pabbar River

Name of River	Boulder (in Metric Tonnes)	Bajri (in Metric Tonnes)	Sand (in Metric Tonnes)	Total (in Metric Tonnes)
Pabbar River	18,91,008	18,91,008	16,20,884	54,02,880
Annual Replenishment				
	94,550	94,550	81,044	2,70,144

Recommendations:

It is evident from the above table that about 54,02,880 metric tons of different sizes of minor minerals are available upto depth of one meter in the river bed of Pabbar River in Shimla District. Similarly, the annual deposition of minor mineral in the river bed is calculated approximately to the tune of 2,70,144 metric tons. It is therefore recommended that mineral concession can be granted in the river bed of Pabbar River from downstream of Chirgaon (confluence of Andhra Khad) up to Sawra and thereafter from downstream to Anti up to Snail by leaving the safe distances/buffer zone from the Hydro Electric Projects, I&PH Scheme and other points of public community Projects.

7.2.3 Giri River

Giri River originates from the hills North of Churdhar near Khara Pathar and flows from Kharapather, Kotkhai, Gumma, Chailla and Sainj area before entering in the Sirmour District. The principal feeder of the Giri is Ashwani Khad, which rises from Mahasu in the Shitnala range and after receiving a considerable contribution from the eastern face of the hill

upon which the Shimla town stands, joins the Giri at a point where the river turns South-East . The Giri and its tributaries also retain perpetual flow of water. Roughly it covers a length of 55 kms. from origin up to Kawnati(entery point in Sirmour District). The Giri River carries good quantity of Boulder, Cobbles, Pebbles and Sand material as a no. of perennial tributaries joins the Giri River at various points. Some mineral bearing horizons of Giri River were earlier used to auction prior to 2003, which waswithheld later on due to applicability of Forest Conservation Act-1980.

Table 8: The key characteristic of Giri River and its major tributaries

Name of the River	**Length (in km)**	**Catchment Area (in Sq.km)**	**Average Width(in mtrs.)**
Giri River	55Km.	550 Sq Kmtrs.	45mtrs.
Origin Of Giri River	From hillocks of Khara Pathar, 2600 Meter above Mean Sea Level.		
Important tributaries of the catchment.	Chehar Khad, Chanar Khar, Pajole-ka-Nala, Dasna ka Nala, Kiyar-ki-Khad, Chhoti Nala, Basari River, Chakhred Khad Mangled Khad, Ashni River etc.		

Geological Conditions:

The Giri River in most of its course flows through high mountainous terrain to low hills and intervening valleys of the Jutogh Group of rocks. The carrying capacity of the said river is good enough as different khad Nallah joins the river at different spots. The track of Giri River is long enough and it covers about length of 55 Kms. in District Shimla.

Total Potential of Giri River:

On the basis of drainage analysis, No. of tributaries, average erosion in the river bed, the annual deposition of minor mineral in the river bed has been calculated by taking into consideration the annual deposition of about 3 Cms. The total potential of the Giri River is given in the table:

Table 9: Total Potential of Giri River is given in the table below:

Name of River	Boulder (in Metric Tonnes)	Bajri (in Metric Tonnes)	Sand (in Metric Tonnes)	Total (in Metric Tonnes)
Giri River	13,30,560	9,97,920	9,97,920	33,26,400
Annual Replenishment				
	39,916	29,938	29,938	99,792

Recommendations:

It is evident from the above table that about 33,26,400 metric tons of different sizes of minor minerals are available upto depth of one meter in the river bed of Giri River in Shimla District. Similarly, the annual deposition of minor mineral in the river bed is calculated approximately to the tune of 99792 metric tons. It is therefore recommended that mineral concession can be granted in the river bed of Giri River after leaving the safe distances/buffer zone from the Hydro Electric Projects, I&PH Scheme and other points of public community Projects from downstream of Anu up to Pajole (confluence of Pajole ka Nala) and thereafter from downstream to Devthi near Chailla up to Karganun i.e. last boundary where the Giri river enters in the Sirmour District.

7.2.4 Shalvi River

The Shalvi River originates from Kupar Spring, Tibba about an altitude of 3358 mtrs. and passes through Garli, Sihana, Janglog, Gadah, Koti, Maraun, Jhikali Pull, Batewari, Dadrana, Tarsanu, Nerwa, Biri, Banrgaon, Sugraithi, Batera etc. areas of Shimla District before entering in to Sirmour District of Himachal Pradesh near Atal. The river has a good potential of minor minerals i.e. Cobble, Pebbles, sand and river borne bajri as a no. of tributaries nallas/choes joints the Shalvi river at various places.

Table 10: The Key Characteristic Of The Shalvi River And Its Major Tributaries

Name of the River	Length (in km)	Catchment Area (in Sq.km)	Average Width(in mtr)
Shalvi River	40 Kms.	400 Sq Kmtrs.	45 mtrs.

Origin of Shalvi River	From base of Kupar Spring, Tibba, 3358 meter above Mean Sea Level.
Important tributaries of the catchment.	Kujnal Khad, Chahag Khad, Ghardi Khad, Shirut Khad, Khaliti Khad, Kyarti Khad, Nauti Khad, Kyarun Khad, Shautha Khad, Lakhawati Khad, Deya khad, Dharara Khad, Gharat Khad, Mashran Khad, Phaula Khad, Gurti Khad and Ali Khad etc.

Geological Conditions:

The Shalvi river in most of its course flows through high mountainous terrain to low hills and intervening valleys of the Jutogh Group of rocks. The carrying capacity of the said river is good enough as different khad Nallah joins the river at different spots. The track of Shalvi River is long enough and it covers about length of 40 Kms. in District Shimla.

Total Potential of Shalvi River:

On the basis of drainage analysis, no. of tributaries, average erosion in the river bed, the annual deposition of minor mineral in the river bed has been calculated by taking into consideration the annual deposition of about 4 Cms.

Table 11: The Total Potential Of The Shalvi River

Name of River	Boulder (in Metric Tonnes)	Bajri (in Metric Tonnes)	Sand (in Metric Tonnes)	Total (in Metric Tonnes)
Shalvi River	9,67,680	7,25,760	7,25,760	24,19,200
Annual Replenishment				
	38,708	29,030	29,030	96,768

Recommendations:

It is evident from the above table that about 24,19,200 metric tons of different sizes of minor minerals are available upto depth of one meter in the river bed of Shalvi River in Shimla District. Similarly, the annual deposition of minor mineral in the river bed is calculated approximately to the tune of 96,768 metric tons. It is therefore recommended that mineral concession can be granted in the river bed of Shalvi River after leaving the safe distances/buffer zone from the Hydro Electric Projects, I&PH Scheme and other points of public community Projects from downstream of Koti up to up to near Atal (confluence with Ali Khad) i.e. last boundary where the Shalvi river enters in the Sirmour District .

7.3 Drainage Pattern

About 65% of the district is constituted of Tons Watershed, Shalvi Watersed, Pabar Watershed and Giri Watershed these jointly form Yamuna Catchment. River Yamuna, a main tributary of Ganges River. This river is perennial in nature and it originates from Yamunotri Glacier near Baderpoonch peaks (38° 29' N, 78° 27' E) at an elevation of about 6387 meters above mean sea level (MSL) in district Uttrakashi of State of Uttrakhand. The remaining 35 % is drained by the Satluj River. Satluj or Sutlej river rises from beyond Indian borders on the Southern slopes of the Kailash mountain near Mansarover lake from Rakas lake, as Longcchen Khabab river (in Tibet). It is the largest among the five rivers of Himachal Pradesh.

S.No.	Basin	Area (Sq. Km)	Percentage Area
1	**Tons Watershed**	354.1	6.90
2	**Shalvi Watershed**	745.73	14.53
3	**Satluj Watershed**	1825.5	35.58
4	**Pabbar Watershed**	1260.48	24.57
5	**Giri Watershed**	945.3	18.42
Total		**5131.11**	**100**

The drainage pattern is mostly dendritic to sub-dendritic i.e. the tributaries meet at low angles and branch at random, like a tree pattern. A dendritic drainage pattern indicates comparatively low permeable rocks which allow high drainage density in the district.

The relation of the drainage density (D) and the runoff (R) can be expressed as:

Percolation = 1/D X R

This means lower the D (Drainage density) lower the runoff (R) and the higher the percolation and vice versa.

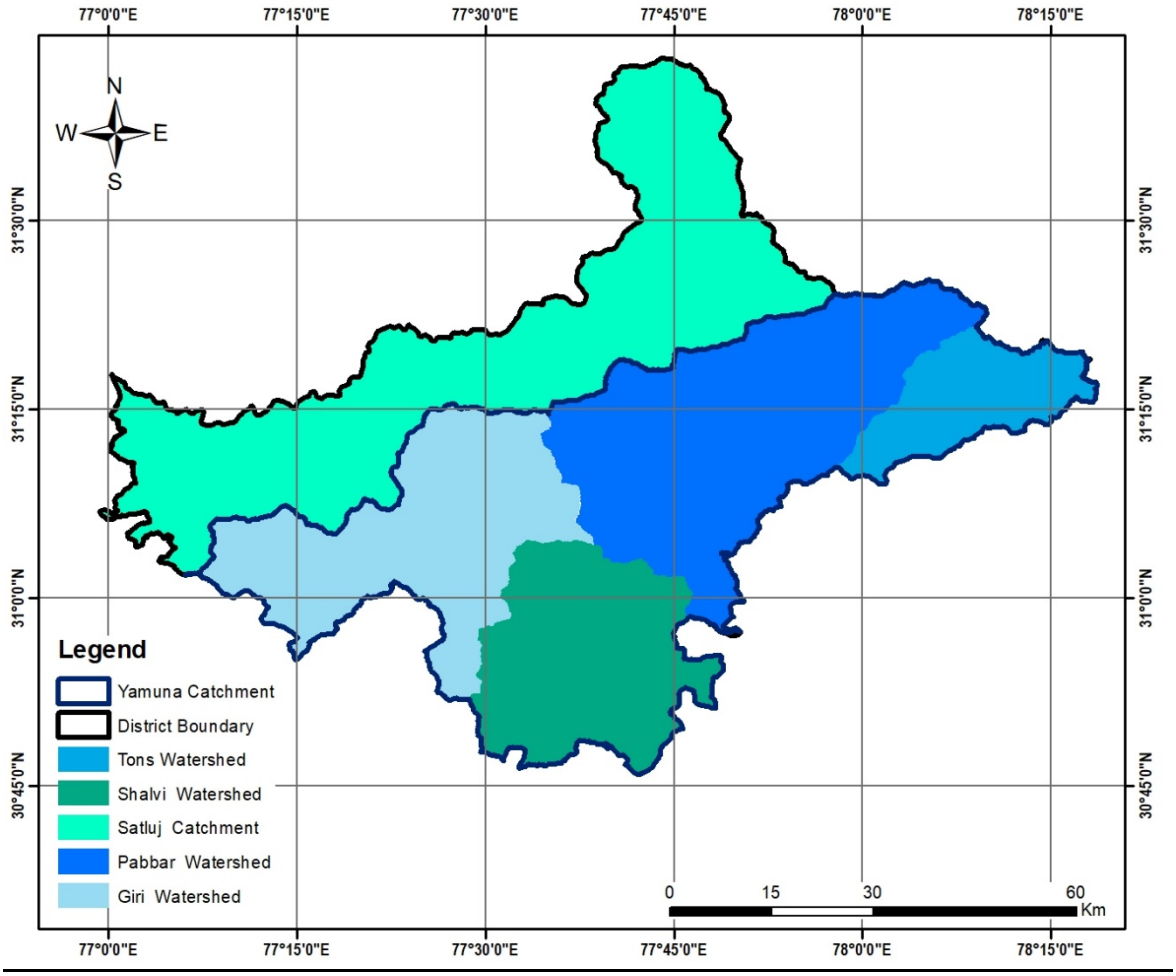


Fig showing Watershed Map of Shimla District

Further, the dendritic pattern in the Shimla district i.e., in the Himalayas System is mainly controlled by the structural influences which further limit the percolation of rainwater to groundwater reserve at the structural contacts.

Drainage density can affect the shape of a river's hydrograph during a rain storm. Rivers that have a high drainage density will often have a 'flashier' hydrograph with a steep falling limb. High densities can also indicate a greater flood risk which leads to damage of roads and habitats. In the Shimla district, the drainage density ranges from 0.004 to 1.705 KM/KM2. The areas with high drainage density lead to flooding in the lower areas and deposit the RBM (River Borne Material) when the hydrograph limb falls steeply as shown in the image.

7.4 Stream ordering

The stream order hierarchy was officially proposed in 1952 by Arthur Newell Strahler, a geoscience professor at Columbia University in New York City, in his article "Hypsometric (Area Altitude) Analysis of Erosional Topology." The article, which appeared in the Geological Society of America Bulletin outlined the order of streams as a way to define the size of perennial (a stream with water in its bed continuously throughout the year) and recurring (a stream with water in its bed only part of the year) streams.

When using stream order to classify a stream, the sizes range from a first-order stream all the way to the largest, a 12th-order stream. A first-order stream is the smallest of the world's streams and consists of small tributaries. These are the streams that flow into and "feed" larger streams but do not normally have any water flowing into them. In addition, first and second-order streams generally form on steep slopes and flow quickly until they slow down and meet the next-order waterway.

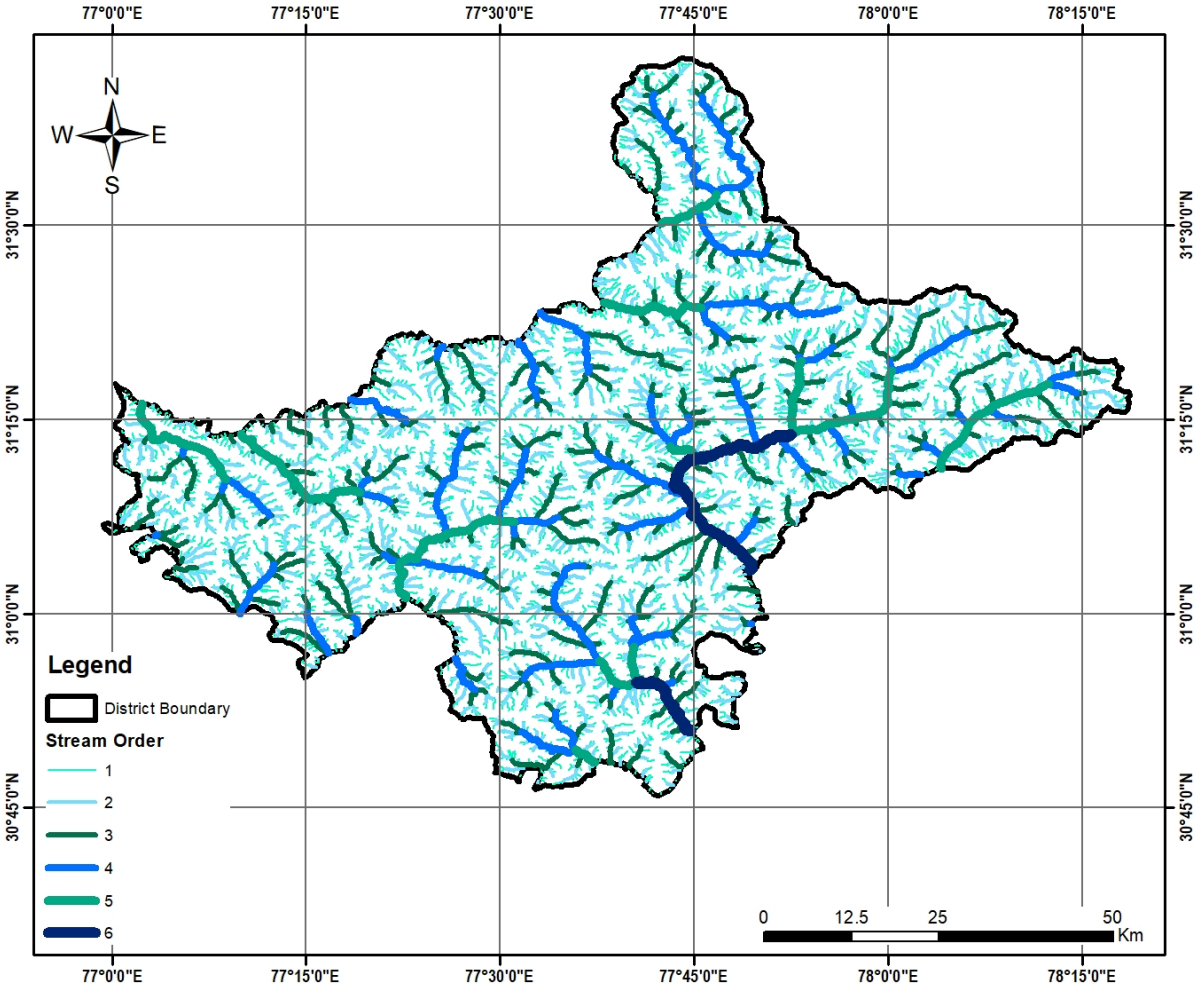


Fig showing Stream Order of Shimla District

First through third-order streams are also called headwater streams and constitute any waterways in the upper reaches of the watershed. It is estimated that over 80% of the world's waterways are these first through third-order, or headwater streams.

Going up in size and strength, streams that are classified as fourth through sixth order are medium streams while anything larger (up to 12th order) is considered a river. For example, to compare the relative size of these different streams, the Satluj River in the Shimla district is a 5th-order stream. The world's largest river, the Amazon in South America, is considered a 12th-order stream.

Unlike the smaller order streams, these medium and large rivers are usually less steep and flow slower. They do however tend to have larger volumes of runoff and debris as it collects in them from the smaller waterways flowing into them.

7.4.1 Going Up in Order

When studying stream order, it is important to recognize the pattern associated with the movement of streams up the hierarchy of strength. Because the smallest tributaries are classified as first order, they are often given a value of one by scientists It then takes a joining of two first-order streams to form a second-order stream. When two second-order streams combine, they form a third-order stream, and when two third-order streams join, they form a fourth and so on.

If however, two streams of different order join, neither increases in order. For example, if a second-order stream joins a third-order stream, the second-order stream simply ends by flowing its contents into the third-order stream, which then maintains its place in the hierarchy.

7.4.2 The Importance of Stream Order

This method of classifying stream size is important to geographers, geologists, hydrologists and other scientists because it gives them an idea of the size and strength of specific waterways within stream networks- an important component of water management. In addition, classifying stream order allows scientists to more easily study the amount of sediment in an area and more effectively use waterways as natural resources. Stream order also helps people like biogeographers and biologists in determining what types of life might be present in the waterway. This is the idea behind the River Continuum Concept, a model used to determine the number and types of organisms present in a stream of a given size. Different types of plants for example can live in sediment-filled, slower-flowing rivers like the lower Ganges than can live in a fast-flowing tributary of the same river

Whether it is used by a GIS, a biogeographer, or a hydrologist, stream order is an effective way to classify the world's waterways and is a crucial step in understanding and managing the many differences between streams of different sizes.

7.5 Water Basin Geometric Analysis

The total area of District Shimla is 5131 sq. Km out of which the water basin of River Yamuna covers an area of 3305 sq. Km which is about 65 percent of the out area rests 35 percent is the Satluj basin which lies south of the district. Yamuna catchement constitutes of Tons Watershed, Shalvi Watershed, Pabbar Watershed and Giri Watershed.

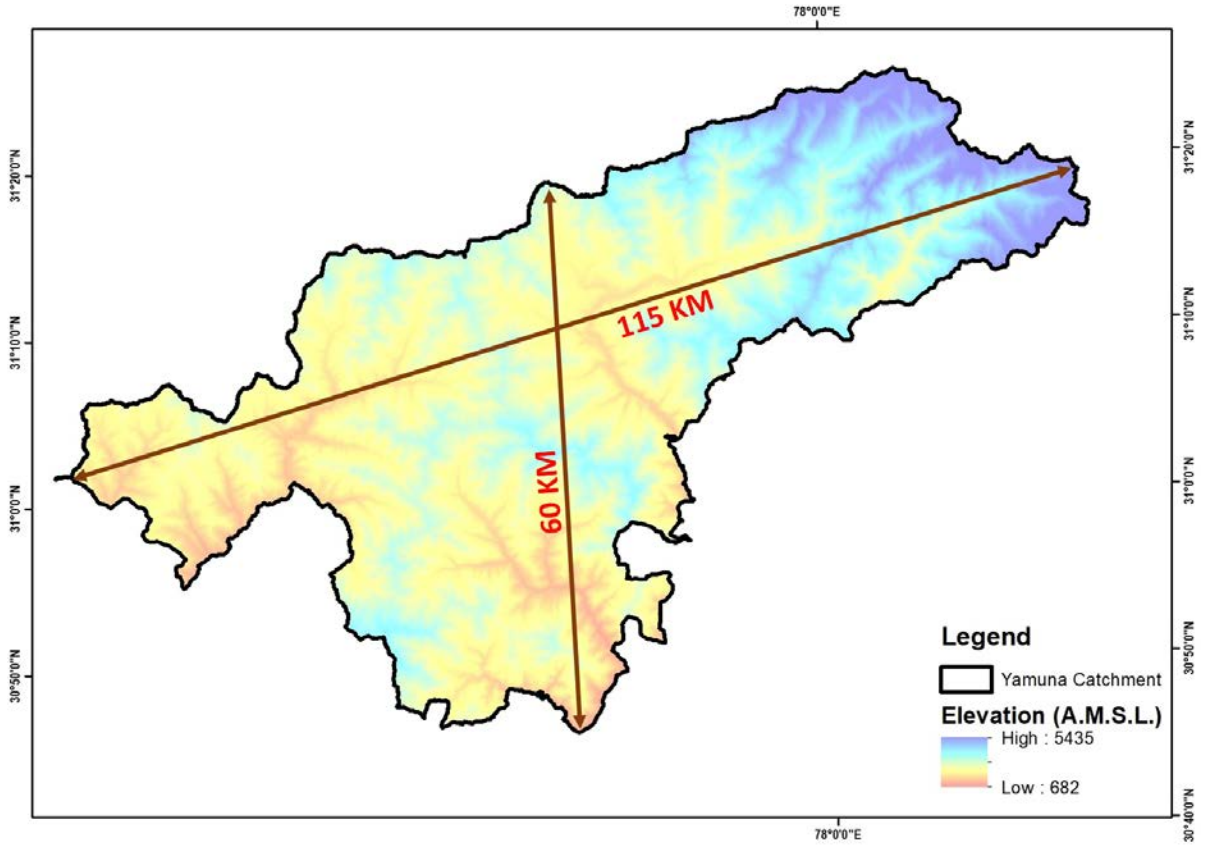


Figure showing the Water Basin of the Yamuna River in District Shimla

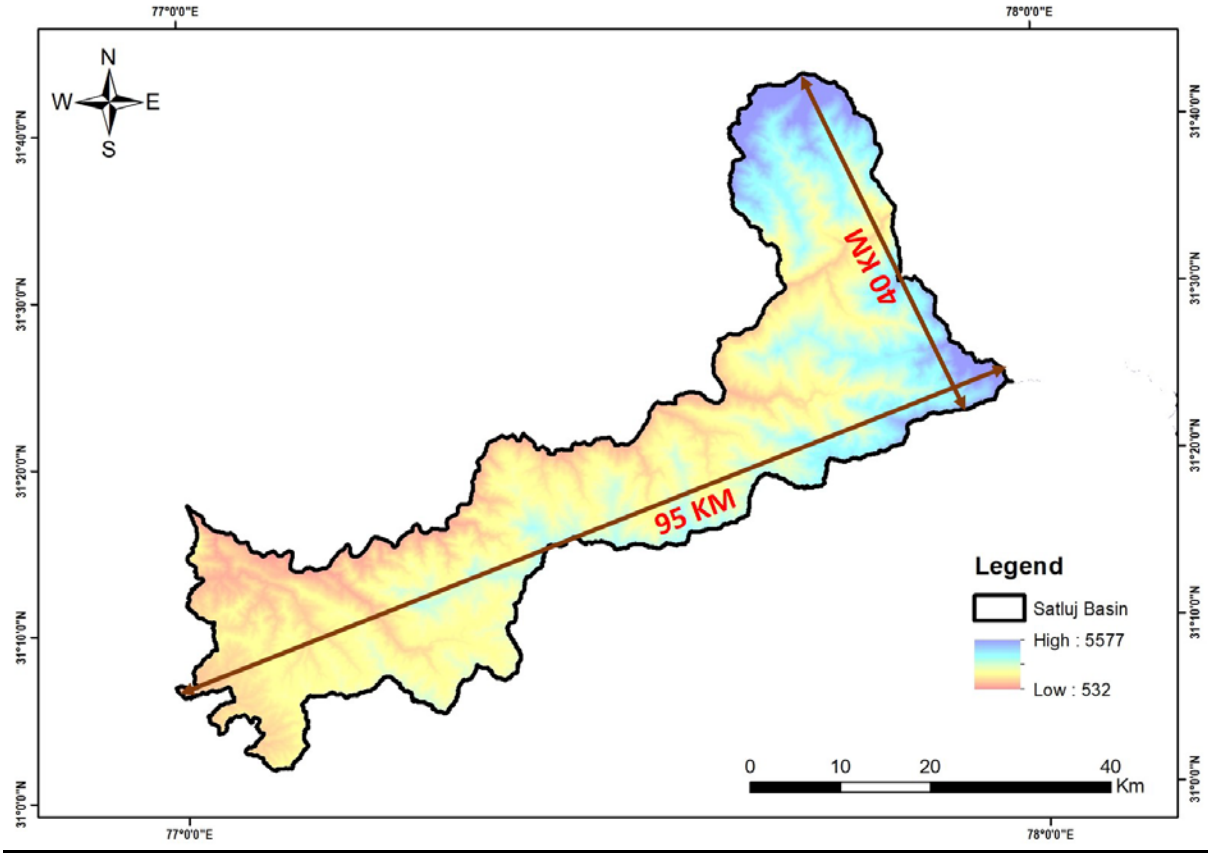


Figure showing the Basin of the Satluj River in District Shimla

The highest point of the Yamuna basin is about 5435 meters and the lowest point is 532 meters and entire water basin has an asymmetric geometry having an average length (L) along the main stream of about 115 Km. The breadth (B) of the said area then can be calculated as:

$$B = Area/ L$$

Hence the breadth is about 28.79 Km.

The highest point of the Satluj basin is about 5577 meters and the lowest point is 682 meters and entire water basin has an asymmetric geometry having an average length (L) along the main stream of about 60 Km. The breadth (B) of the said area then can be calculated as:

$$B = Area/ L$$

Hence the breadth is about 19.26 Km.

The length-breadth ratio of the Yamuna basin in the Shimla district comes out to about 1.96 which means higher asymmetry. Further, the higher the ratio higher the asymmetry.

The length-breadth ratio of the Satluj basin in the Shimla district comes out to about 2.375 which means higher asymmetry. Further, the higher the ratio higher the asymmetry

7.6 Relief

Terrain, or land relief, is the vertical and horizontal dimension of the land surface. When relief is described underwater, the term bathymetry is used. Terrain is used as a general term in physical geography, referring to the lay of the land. This is usually expressed in terms of the elevation, slope, and orientation of terrain features. Terrain affects surface water flow and distribution. Over a large area, it can affect weather and climate patterns.In terms of environmental quality, agriculture, and hydrology, understanding the terrain of an area enables the understanding of watershed boundaries, drainage characteristics, water movement, and impacts on water quality. Complex arrays of relief data are used as input parameters for hydrology transport models (such as the SWMM or DSSAM Models) to allow the prediction of river water quality.

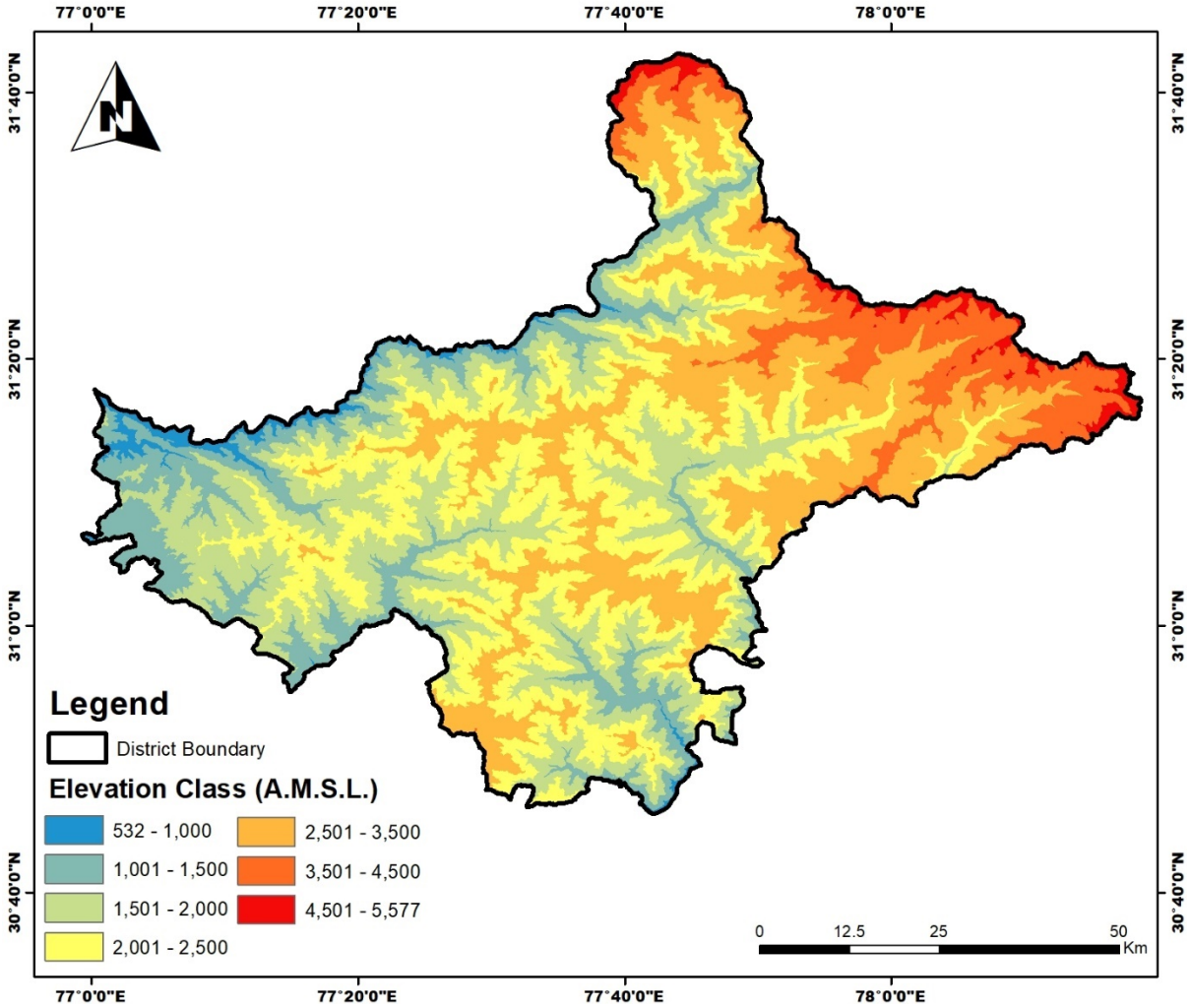


Figure Showing Elevation Map Of The District

7.7 Reserve Calculation

The reserve calculations are based on the following expression:

Total reserve = Volume X Tonnage Factor

Where the volume of the deposit is approximated by Length, Breadth and height parameters.

7.7.1. Tonnage Factor

Method For Calculation of Reserves:-

METHODOLOGY:

On an average the competency of stream at the point of mining site is 10 to 15 cm x 4 to 6 cm but it is also important to mention here that there is a provision in the river/strem bed mining policy guidelines where collection of material upto a depth of 1 metre is allowed in a single season where mineral concessions have been granted, and it is noticed that during flood season whole of the pit so excavated is completely filled up and as such the excavated area is replenished with new harvest of mineral. However vide notification dated 29.02.2024 **Himachal Pradesh Mineral Policy, 2024 for regulation of mines and minerals in Himachal**

Pradesh came to existence and thus allowing 2m depth instead of 1m , but during the preparation of this report calculations are done with 1 m depth.

In order to calculate the mineral deposits in the stream beds, the mineral constituents have been categorized as clay, silt, sand, bajri and boulder and there average %age is taken into account. It is observed in different rivers/streams that % age of boulders varies from 30% to 70%, bajri 15 % to40%, sand from 15% to 30% and silt .Only boulder bajri and sand is the resource mineral i.e. usable mineral and rest is taken as the waste. Further the Survey of India Topo-Sheets were used as base map to know the extent of river course. The mineral reserves have been calculated only upto 1.00 metre depth although there are some portions in the river beds such as channel bars, point bars and central islands where the annual deposition is raising the level of river bed thus causing shifting of the rivers towards banks and causing cutting cosequently of banks and at such locations, removal of this material upto the bed level is essential to control the river flow in its central part and to check the bank cutting. While calculating the mineral potentials, the mineral deposits lying in the sub-tributaries of that particular stream/river has not been taken into consideration. Since these mineral deposits are adding annually to the main river, the mineral deposits will be much more.

(Length x Width x Depth x Specific Gravity x 0.6)= X

Annual Replishment

The annual replishment of the material depends up on the discharge, grade of river and geology of catchment area. Based on the studies it is inferred/concluded that excavated area will fully be replenished during single monsson. The replishment factor is taken to be 3-7 % of annual production.

The tonnage factor is the parameter that directly converts the volume of the mineral to the weight of the mineral. In the metric system, the tonnage factor is the specific gravity of the ore and the specific gravity is a function of the mineral composition of the ore. The most accurate method of determination of the specific gravity of the ore is to determine the average specific gravity of the individual mineral of the ore provided with the accurate relative percentages.

The relative percentage of minerals in the River System in the Shimla district is as below

Granite = 35 %

Quartzite = 20 %

Phyllite = 15 %

Limestone = 7 %

Dolomite = 10 %

Slate = 3 %

Therefore the total specific gravity of the mineral in the Shimla district is calculated by

Granite => 2.7 ×0.35 = 0.945

Quartzite => 2.8 × 0.20 = 0.560

Phyllite => 2.6 × 0.15 = 0.390

Limestone => 2.7 × 0.07 = 0.189

Dolomite => 2.7 × 0.10 = 0.270

Slate => 1.8 × 0.03 = 0.054

Total Specific Gravity = 2.4

The average height of the deposit in any mining spot is taken (i.e. 1 meter) by considering the annual replenishment factor.

7.7.2 Annual Replenishment Factor

Replenishment of river bed material takes place is the deposition of the sediments of different sizes carried by the stream. Many factors such as topography, soil type, bedrock type, climate and vegetation cover influence the input, output and transport of sediment and water in a drainage basin (Charlton; 2008). Sediment transport knowledge is important in river restoration, ecosystem protection, navigation, watershed studies and reservoir management. These factors also influence the natural pattern and carrying capacity of water bodies (Twidale, 2004). Di-siltation (removal of .excess sand and stone from river bed) of the river helps to maintain the carrying capacity and provides protection from flooding during monsoon season. However, in the subsequent rainy season grain/particle size distribution analysis of bed load samples must be done to define the size composition of the material in transit.

The elevation of Shimla district ranges from 532 m to 5577 m above mean sea level with varied agro-climatic conditions. Geomorphologically the Shimla district can be broadly divided into two regions i.e. the Yamuna Catchment area and the Satluj Catchment area which plays an important role in deciphering the sub-surface and surface hydrogeological conditions. On the basis of hydro-geomorphological and geological set-up, the study area can be divided into the following geomorphic units.

Shimla District, located in the Indian state of Himachal Pradesh, is characterized by a diverse range of geomorphological features. The region's landscape is shaped by its mountainous terrain, river valleys, and geological formations. Here are some key geomorphological features of Shimla District:

i. Mountain Ranges:

Himalayan Range: Shimla District is part of the greater Himalayan mountain system, featuring rugged terrain with steep slopes and high peaks. The region is dominated by the Middle Himalayas and the Lesser Himalayas.

Shivalik Hills: These are the outermost hills of the Himalayas, located at the lower elevations of Shimla District. They consist of sedimentary rocks and are known for their relatively gentle slopes compared to the higher ranges.

ii. River Valleys:

Satluj River Valley: The Satluj River flows through the northern part of Shimla District, carving deep valleys and gorges. The river's course significantly influences the topography of the area.

Pabbar River Valley: Another important river in the district, the Pabbar River, creates scenic valleys and is a crucial water source for the region.

iii. Glacial Features:

Glacial Moraines: Remnants of ancient glaciers, such as moraines, are found in the higher altitudes of Shimla District. These features provide evidence of past glacial activity in the region.

iv. Structural Landforms:

Fault Lines and Folded Structures: The district exhibits various geological structures, including fault lines and folded rock formations, due to the tectonic activities associated with the Himalayan orogeny.

v. Soil Types:

Alluvial Soil: Found in the river valleys, particularly along the Satluj and Pabbar rivers, these soils are fertile and support agriculture.

Mountain Soils: The higher elevations have mountain soils that are less fertile but support dense forest cover and alpine vegetation.

vi. Erosional Features:

Gullies and Ravines: Intensive erosion processes have led to the formation of gullies and ravines, especially in areas with loose, unconsolidated sediments.

Terraces: Fluvial terraces along the rivers are formed by periodic down-cutting and deposition processes.

vii. Forests and Vegetation:

Dense Forest Cover: Shimla District is known for its rich forest cover, including deodar, pine, oak, and rhododendron forests. These forests play a crucial role in soil conservation and maintaining ecological balance.

viii. Human-Induced Changes:

Urbanization and Development: The growth of Shimla town and other settlements has led to significant changes in the natural landscape, including deforestation, terracing for agriculture, and construction activities.

ix. Climate Influence:

Microclimatic Zones: The varied elevation and topography create microclimatic zones within the district, influencing weather patterns, vegetation types, and soil characteristics.

Sedimentation in any river is dependent on sediment yield which depends on erosional factors in the river's catchment area. Annual replenishment is based on the location of the depositional spot in the river bed, meandering of the river, geology, weathering conditions and height of the rainfall in the area. The annual replenishment is determined here by the average of the various heights of deposition per year in a specific location.

The Sediment load deposition in a river is dependent on the catchment area, weathering index of the various rock types of the catchment area, land-use pattern of the area, rainfall data and grain size distribution of the sediments. Again, the sediment load estimation is not a dependent variable of the district boundary, but it largely depends upon the aerial extents of the catchment areas, which cross the district and state boundaries.

7.8 Mineral Deposits due to heavy floods in the Rivers

Himachal Pradesh witnessed severe monsoon seasons every year characterized by massive landslides, slope failures, rockfalls, cloudbursts, and flash floods. This monsoon has been unusually intense, with most areas experiencing significantly higher rainfall than the average. The continuous heavy rainfall reduced the land's moisture retention capacity to its minimum level, while the water levels of the rivers reached all-time high flood levels in the various rivers like Giri, Satluj and its tributaries. The river beds of the various rivers are very wide and change in river course is a natural phenomenon during floods. The formation of islands due to heavy deposition which is up to 3-4 meters in height, has been a dominant factor for river course changes. In many places, the river course change has been seen at the point of confluence too wherein the primary factor is the deposit of huge debris and boulders by the tributary stream.

8.0 General Profile Of The District

8.1 Introduction

Shimla district forms a part of southern Himachal Pradesh. The district lies between the longitudes 77°0' and 78°19' east and latitudes 30c45' and31°44' north and is bounded by Mandi and Kullu district in the north, Kinnaur in the east, the state of Uttaranchal and Sirmaur district in the south and by Solan district in the west. The shape of the district is somewhat rectangular with slight bulges on the western side intruding towards Solan district and on the northern side towards Kullu district. The district has an area of 5,131 Sq. kms. out of the total area of 55,673 Sq. kms.of Himachal Pradesh according to the Surveyor General of India.

The district is entirely mountainous except few small valleys. The district has a number of peaks such as Jakhu in Shimla town, Siah near Chail, Churdhar in Tehsil Chaupal, Chansil in Rohroo Tehsil, Hatto in Kumarsain Tehsil and Shali in Sunni Tehsil. Mostly the terrain is rough. The prevalence of interlocking spurs narrows and steep-sided valleys with high peaks and thick forests of Deodar and Kail throughout the district are the general topographical features of the districts. On the whole, the soils are young and thin, however, these get heavier and comparatively acidic with an increase in altitude. The Shoghi -Taradevi-Shimla-Narkanda Ridge forms a water divide between the Indus and Ganga River systems, The Satluj, Pabbar, Tons and Giri are the principal rivers of the Shimla District. Important glaciers of the district are confined to the Pandra bis area.

Shimla district is one of the twelve districts of the state of Himachal Pradesh in northern India. Its headquarters is the state capital of Shimla. Neighbouring districts are Mandi and Kullu in the north, Kinnaur in the east, Uttarakhand in the southeast, Solan to the southwest and Sirmaur in the south. The elevation of the district ranges from 987 metres (3,238 ft) to 4,500 metres (14,764 ft).

District Profile

a. Demographic Profile-table-

Area	5131 sq,kms
Area (out of total area) of H.P.	9.22 %
Sub-Divisions	Total = 11 Shimla Urban, Shimla Rural, Theog Chaupal, Rampur, Rohru, Kumarsain Dodra-Kawar, Jubbal, Kupvi & Kotkhai
Tehsils	Total = 17

	Rampur, Kumarsain, Seoni, Shimla Urban, Shimla Rural, Theog, Chaupal Jubbal, Kotkhai, Rohru, Chirgaon Dodra-Kawar, Nerwa, Kupvi, Nankhari, Tikkar & Junga
Population (Census 2011)	814,010
Urban	210,351
Rural	612,659
No. of Male	425,039
No. of Female	388,971
No. S.C. Population	215,777
No. S.T. Population	8,755
Population density	159
Population growth	12.58%
Literacy Rate	83.64%
Male literacy	90.73%
Female literacy	75.93%

b. Administrative Profile-table-

No. of Sub-division	11
No. of Development Blocks	8
No. of Tehsil:	17
No. of Sub- Tehsil :	7
No. of Local Urban Bodies	03
No. Zila Parishad	01
No. of Panchayats Samities	8
No. of Panchayat	230
No. of Backward Panchayats	38
No. of Villages	1426

c. Road-table-

Total Road length in the district as of 1/09	5229 K.M
Kachha Road length	2274 K.M.
Pachha Road length	2295 K.M.
Total Panchayat connected with road	168
Total villages connected with road	1090

d. Forest -table-

Area under forests	3582 sq. km (80%)

e. Irrigation-table-80

Area under irrigation	312 Sq.km

f. Agriculture-table-

Major crops grown	Wheat, Maize, Rice & Potato
Area under agriculture	59,632 Hect.
Fertilizer consumption (per hectare)	15 Kgs.
Per capita food grain production	165 Kgs.

g. Horticulture -table-

Area under horticulture	37,500 Hect.
Type of fruits produce	Apple, Peach, Plum, Apricot & Pears
Total fruits production	390,000 Metric tonnes/Yr

h. Electricity-table-

No. of Electrified villages	1300

i. Health-table-

No. of Health institutions	92
Zonal Hospital	1
Civil Hospitals	3
CHC	11
PHCs	82
Sub Centres	362
Ayurvedic health institutions	31

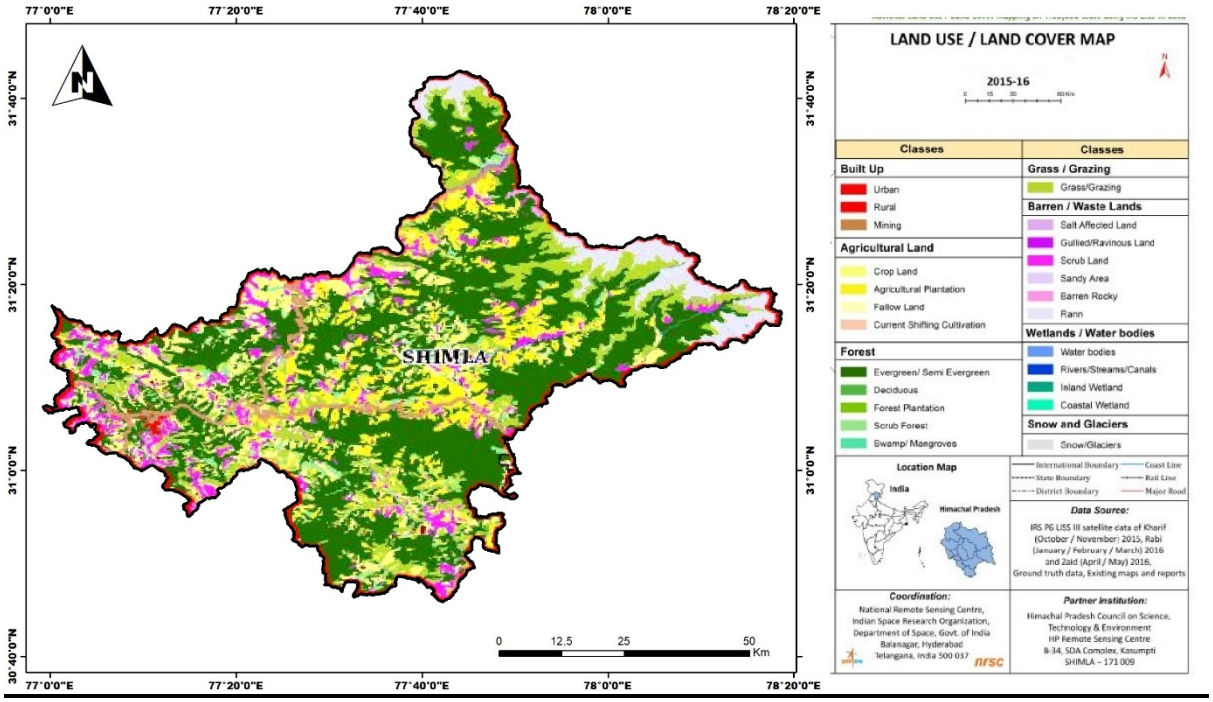
j. Education-table-

No. of Colleges :	10
Dental College	1
Engineering College	4 (Govt.) 2 (Private)
Polytechnic College	1 (Govt.)
No. of Sr. Sec. Schools	1339
No. of High Schools	124
No. of Middle Schools	993
No. of Primary schools	2760

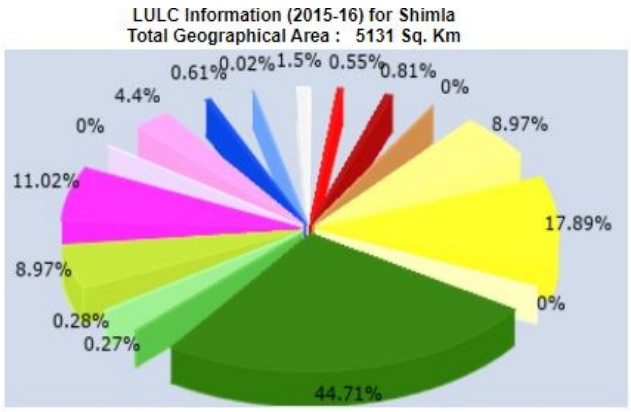
No. of BE.d College	5
No. of ITI	3
No. of ITC	8
No. of SCVT	57

9. Land Utilization Pattern In The District: Forest, Agriculture, Horticulture, Mining Etc.

The economy of Shimla district is predominately agrarian as around 79 per cent of the total population is dependent on agriculture and activities allied to it for earning their livelihood. The moisture retention capacity of the area is poor due mainly to the fact the bedrock are argillaceous and the land the uneven. The crops usually face moisture stress during the remaining period of the year due to inadequate and irregular rainfall. The irrigation facilities are provided by lifting water from streams, shallow dug wells and medium to deep tube wells in the valley area.



Land Use Land Cover Map of Shimla District



LULC Class		Area (Sq.Km)	LULC Class		Area (Sq.Km)
	Builtup,Urban	28.17		Builtup,Rural	41.76
	Builtup,Mining	0.13		Agriculture,Crop land	460.09
	Agriculture,Plantation	917.79		Agriculture,Fallow	0.04
	Forest,Evergreen/ Semi evergreen	2293.88		Forest,Deciduous	14.09
	Forest,Scrub Forest	14.23		Grass/Grazing	460.3
	Barren/unculturable/ Wastelands, Scrub land	565.48		Barren/unculturable/ Wastelands, Sandy area	0.06
	Barren/unculturable/ Wastelands, Barren rocky	225.75		Wetlands/Water Bodies, River/Stream/canals	31.14
	Wetlands/Water Bodies, Reservoir/Lakes/Ponds	1.2		Snow and Glacier	76.89

Land Use Land Cover Statistics of District Shimla

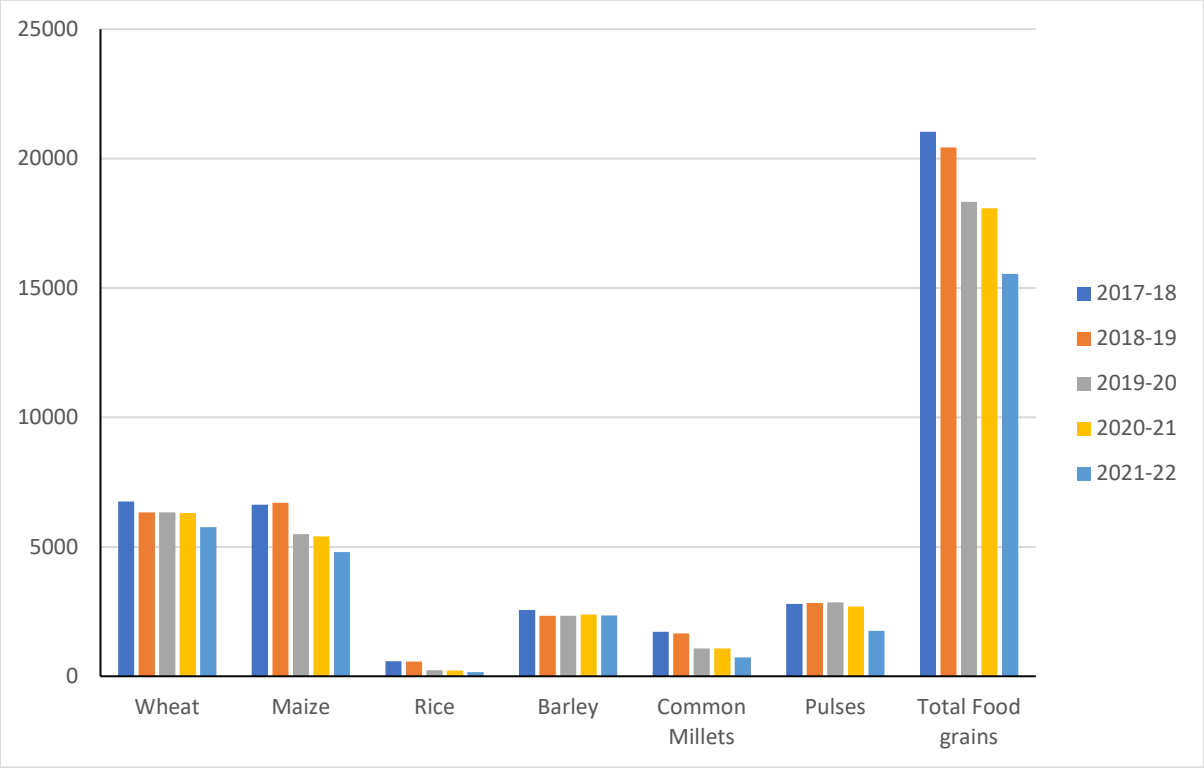
9.1 Agriculture

There is no involvement of agricultural land where mining is proposed, however, in the district, the agricultural and horticultural practices of the region vary from other parts of India due to a variety of factors. The most important one is, of course, the unique climate and landscape of the Himalayas. The mountainous territory strongly influences both techniques and crops. Most agriculture takes place in the form of terrace cultivation, with small strips of mountain slopes that had been more or less levelled out to allow cultivation. The quality of the soil is less than optimal with few nutrients and many small stones and rocky patches. Further, the altitude leads to a harsh climate. While in the valleys with an altitude of around 1500 m above sea level, the cultivation can still take place most of the year; it is reduced in the summer months in regions above 2500 m. Yet, the people there particularly depend on agriculture for survival, largely because the remote locality of their villages denies opportunities in other fields. The area is purely rain-fed, which creates difficulties if the monsoon and snowfall turn out weak. Problems of accessibility and transport are further crucial aspects of the farming in Shimla district.The main cereals grown are wheat, maize, rice, and barley in the district.

Table showing area under Different Crops in Hectares

Year	Wheat	Maize	Rice	Barley	Common Millets	Pulses	Total Food grains
2017-18	6758	6631	577	2556	1713	2797	21032
2018-19	6329	6708	563	2340	1659	2826	20425
2019-20	6329	5491	240	2340	1072	2850	18322
2020-21	6303	5407	217	2380	1070	2698	18075
2021-22	5767	4794	155	2350	726	1751	15543

Source: Directorate of Land Records, HP



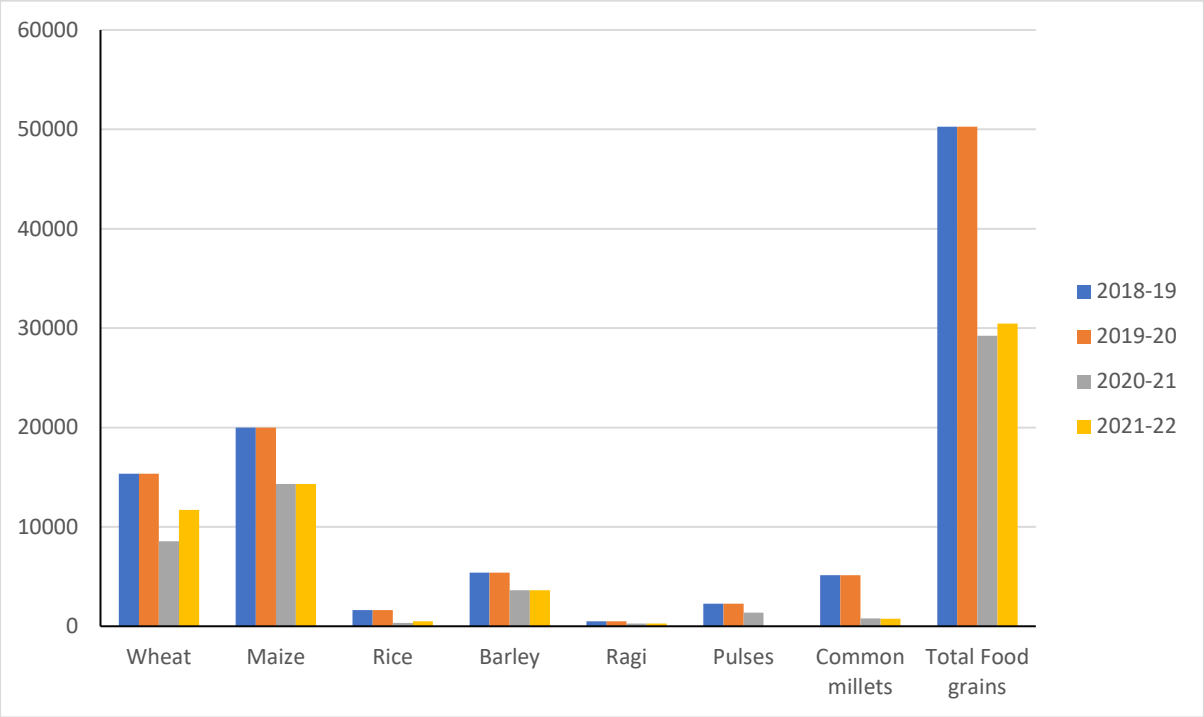
Graph showing Area under Different Crops in Hectares

Table showing production under Different Crops in Metric Tonnes

Year	Wheat	Maize	Rice	Barley	Ragi	Pulses	Common millets	Total Food grains

2017-18	NA	NA	NA	NA	NA	NA	NA	NA
2018-19	15365	19974	1643	5381	485	2286	5141	50275
2019-20	15365	19974	1643	5381	485	2286	5141	50275
2020-21	8544	14328	343	3617.6	265	1376	775.2	29248.8
2021-22	11722	14328	489.25	3617.6	265	NA	757	30469.85

Source: Directorate of Land Records, HP



Graph showing Production under Different Crops in Hectares

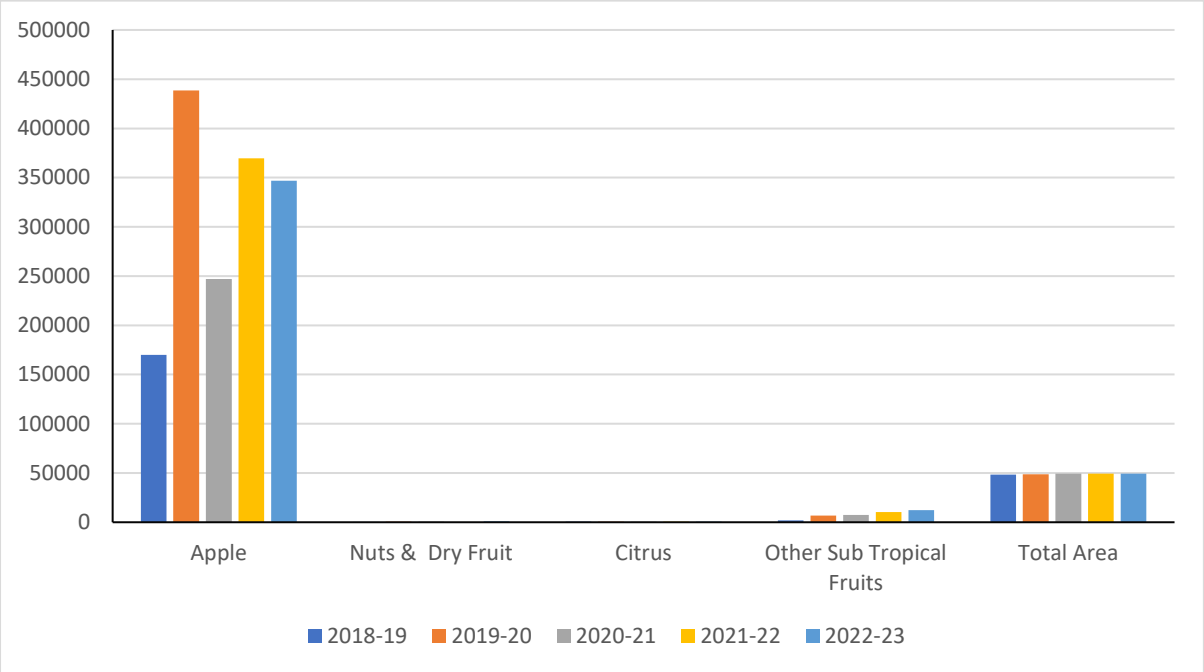
9.2 Horticulture

Horticulture plays an important role in the economic life and prosperity of the people of Shimla. During the last three decades, Shimla has made tremendous progress in the field of Horticulture. Greater emphasis is being laid on this sector because the geographical features and climatic conditions prevailing in the district are ideally suited for fruit farming. Among all the fruits grown in Shimla, apples are the most widely grown and represent commercially the most important fruit crop. The cultivated apple area is 42291 hectares. The annual apple production usually lies between 300,000 to 400,000 metric tons. Apart from apples, the other varieties of fruits grown in Shimla are stone fruits as well as nuts, especially almonds.

Table showing area under Each Category of Fruits in District Shimla

Year	Apple	Nuts & Dry Fruit	Citrus	Other Sub Tropical Fruits	Total Area
2018-19	41104.5	1818.14	710.78	4639.85	**48273.2**
2019-20	41765.2	1778.14	686.22	4608.6	**48838.2**
2020-21	42159.2	1776.83	695.26	4676.16	**49307.4**
2021-22	42177.4	1776.83	737.04	4653.93	**49345.2**
2022-23	42291	1776.87	630.68	4684.44	**49383**

Source: Directorate of Horticulture, HP



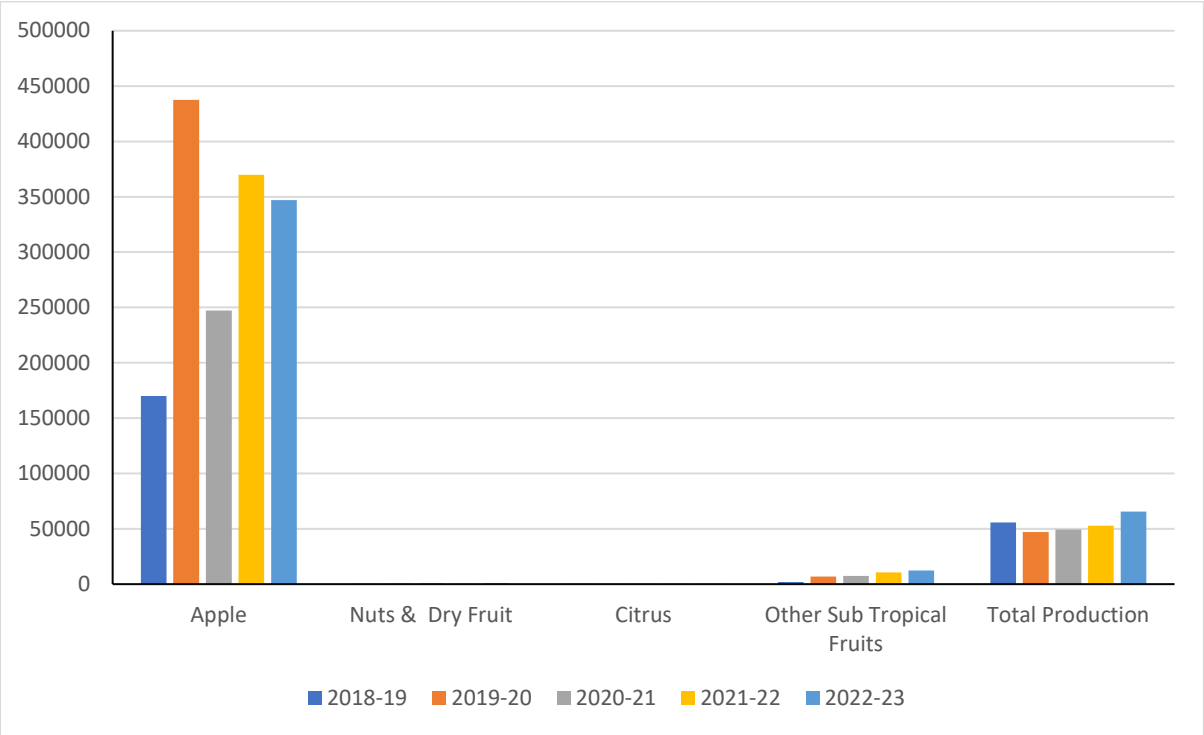
Graph showing Area under Each Category of Fruits in District Shimla

Table showing production under Each Category of Fruits in District Shimla

Table showing Production (In MT) under Each Category of Fruits in District Shimla					
Year	**Apple**	**Nuts & Dry Fruit**	**Citrus**	**Other Sub Tropical Fruits**	**Total Production**
2018-19	169962	144.11	21	2013.69	55719
2019-20	437552.59	453.07	31.91	6826.92	47066
2020-21	247177	693.87	45.89	7377.93	49389

2021-22	369720	365.54	48.89	10498.73	52861
2022-23	346993	871.43	53.91	12205.53	65439

Source: Directorate of Horticulture, HP



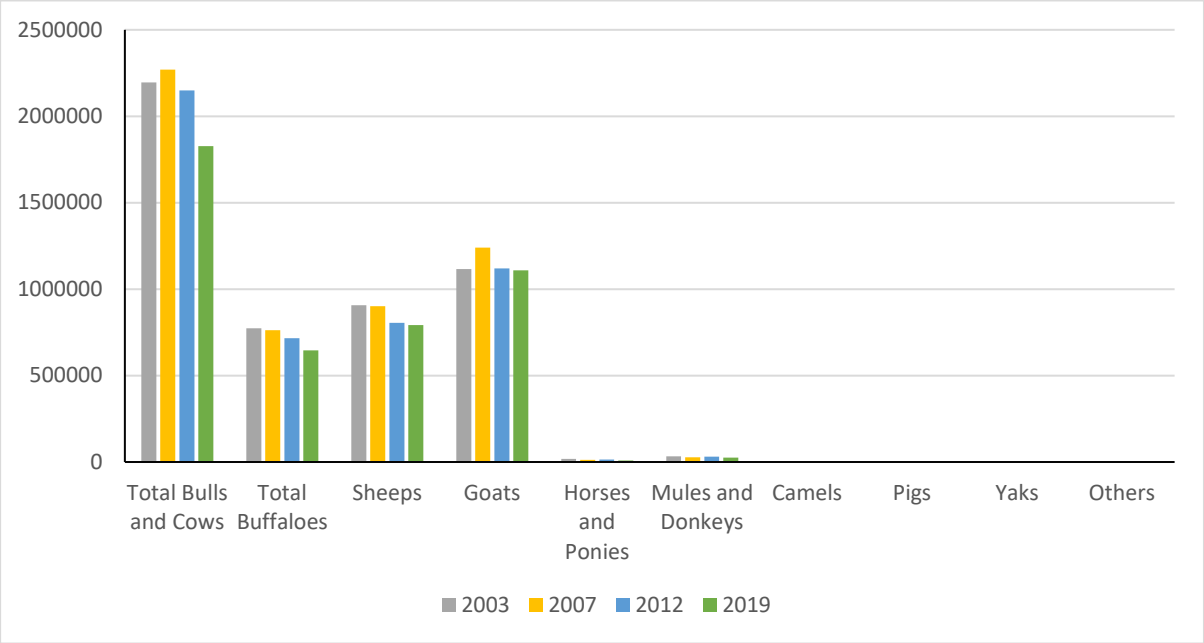
Graph showing Production under Each Category of Fruits in District Shimla

9.3 Animal Husbandry

Animal husbandry plays a very important role in the lives of farmers. They depend upon animals to sustain their day-to-day lives. Large numbers of farmers have adopted animal husbandry as a livelihood activity along with agriculture and horticulture. The animals reared by the farmers are mainly for milk, farm yard manure, and meat purposes. Most of the farmers rear animals for milk production which is mainly used for self-consumption. The livestock kept by the farmers includes cows (local and Jersey) buffaloes, goats and bullocks, etc. Most of the animals are indigenous (local breed) having very low milking capacity.

Table showing Livestock census of District Shimla

Years	Total Bulls and Cows	Total Buffaloes	Sheeps	Goats	Horses and Ponies	Mules and Donkeys	Camels	Pigs	Yaks	Others
2003	2196538	773229	906027	1115587	17144	32797	137	2795	1590	200
2007	2269178	761589	901299	1240836	13155	26361	56	2493	1705	14
2012	2149259	716016	804871	1119491	15081	30664	177	5033	2921	918
2019	1828017	646505	791345	1108413	8851	25212	26	2477	1940	0



Graph showing Livestock census of Shimla District

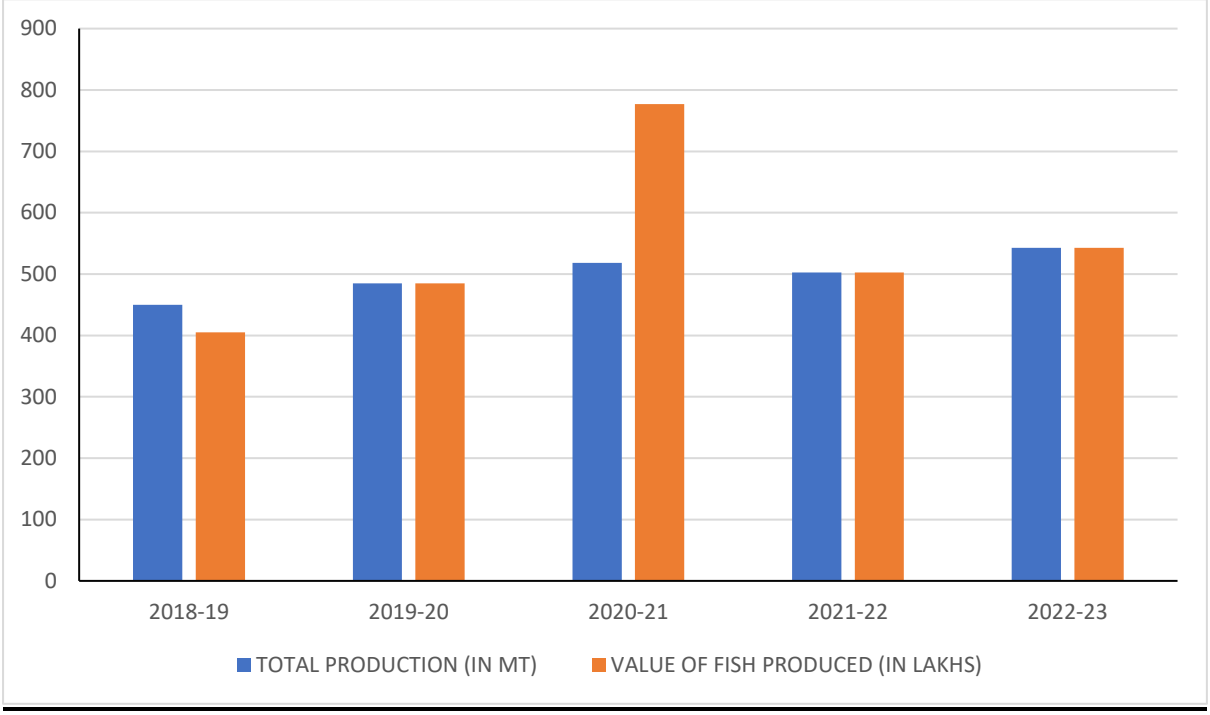
9.4 Fisheries

Reported Fish species in River Pabbar (district Shimla) is Salma gairdneriigairdnerii (Rainbow Trout), Salma truffafario (Brown Trout), Tor Pitutora (Mahaseer), Catlacatla, Labeorohita, Labeo batu, Labeodero, Labeodyochelus, Cirrhinamrigala, Notopteruschitala, Wallgoattu, Nemachilusbotio, Pontius ticto, Pontius sarana, Silver Carp, Mastacimballusarmatus.

Table showing Annual Production of Fisheries and Its Value of Catch in District Shimla

Table showing Annual Production of Fisheries at District Shimla		
YEAR WISE	**TOTAL PRODUCTION (IN MT)**	**VALUE OF FISH PRODUCED (IN LAKHS)**
2018-19	450	405
2019-20	485	485
2020-21	517.99	776.99
2021-22	502.66	502.66
2022-23	542.72	542.72

Source: Fisheries Department, HP



Graph showing Annual Production of Fisheries and Its Value of Catch in District Shimla

9.5 *Forest*

Because of its complex geography and its great variations in altitude, Shimla is home to an enormous range of species, which span the subtropical to the alpine. The common trees in the Shimla hills belong to the conifer species (deodar, pine, spruce, fir). Several species of medicinal plants like Hath Panja (Dactylorhizahatageria) and Brahma Kamal (Saussureaobvallata) grow luxuriously in the valley. The valley is known for the presence of the majestic snow leopard, the Himalayan brown bear and the Himalayan Tahr. The Western Tragopan (the state bird of Himachal Pradesh) and the Monal pheasant are the prominent bird species found in the region.

Flora

Species/ Botanical Name	Common Name	Elevation Range (m)
Abies spectabilis (D.Don.) Mirbel	Himalayan high-altitude fir	3,000-4,000
Abies pindrowRoyle	Silver fir/ Tosh	2,500-3,200
Acer acuminatum Wall. ex D.Don.	Maple	2,500-3,200
Acer caesium Wall. ex Brandis	Maple	2,200-3,000
Aesculus indica Kk. f. & Th.	Horse chestnut/ Khnor	1,800-3,000
Alnus nepalensis D. Don.	Alder	1,500-2,000
Betula utilis D. Don.	Birch/ Bhojpatra	3,000-4,000
Buxus wallichianaBaillon	Boxwood/ Shamshad	2,500-3,000

Cedrus deodara G. Don.	Deodar/ Cedar	2,000-3,000
Cornus capitata Wall.	Dogwood	1,800-2,800
Corylus jacquemontiiDecne.	Hazelnut/ Bhutibadam	2,500-3,200
Cupressus torulosaD.Don.	Pencil cedar	1,800-3,000
Ilex dipyrena Wall.	Holly/ Kaluchha	2,000-2,800

Shrubs

Species	**Altitude (m)**
Aconitum heterophyllum Wall. ex Royle	3,300-4,200
Atropa acuminata Royle	1,500-3,000
Dactylorhizahatageria (D. Don.) Soo	2,800-4,000
Jurineamacrocephala (DC.) Benth.	3,000-4,300
Meconopsis aculeata Royle	3000-4,300
PicrorhizakurroaRoyle ex Benth.	3,200-4,200
SaussureagossipiphoraD.Don	3,800-4,500
Angelica glauca Edgew.	2,000-2,800
Arnebiabenthami (Wall. ex G. Don) I. M. Johnston	3,300-4,000
Arnebiaeuchroma (Royle) Johnston	3,500-4,400
Berberis aristata DC.	1,200-1,500
Betula utilis D.Don.	3,300-4,000
Dioscoreadeltoidea Wall.	2,000-3,000
Fritillaria roylei Hook.	2,800-4,000
Malaxismuscifera Lind.	2,000-3,000
Nardostachys grandiflora DC.	3,600-4,300
Paris polyphylla Smith	2,000-3,000
Podophyllum hexandrumRoyle	2,400-4,000
PolygonatumcirrhifoliumRoyle	1,500-3,000
Polygonatummultiflorum (L.) All	2,500-3,500
Polygonatumverticillatum (L.) All.	1,500-3,300
Saussureaobvallata (DC.) Edgew.	3,600-4,500
Taxus wallichianaZucc.	2,100-3,300
Zanthoxylum armatum DC.	1,200-1,800

Aconitum violaceum Jacq. ex Stapf	3,300-4,200
Ephedra gerardiana Wall. ex Stapf.	3,300-4,500
Hypericum perforatum L.	2,000-3,000
Juniperus communis L.	2,800-4,000
Rheum australe D. Don	3,000-4,200
Rheum webbianumRoyle	3,000-4,000
Roscoea alpine Royle	2,400-3,500
Roscoeaprocera Wall. ex Bak.	2,000-3,000
Selinumconnifolium	2,500-3,500
Selinumvaginatum Clarke	2,500-3,500
SkimmialaureolaSieb. &Zucc.	2,200-3,200
Symplocospaniculata (Thumb.) Miq.	1,500-2,500

Fauna

Common Name	Scientific Name
Asiatic Black Bear	*Ursus thibetanus*
Blue Sheep	*Pseudoisnayaur*
Common Leopard	*Panthera pardus*
Himalayan Brown Bear	*Ursus arctos*
Himalayan Ghoral	*Naemorhedus goral*
Himalayan Musk Deer	*Moschus chrysogaster*
Himalayan Tahr	*Hemitragusjemlahicus*
Red Fox	*Vulpes vulpes*
Serow	*Nemorhaedussumtraensis*
Snow Leopard	*Uncia uncia*

Birds

Little Forktail, Tirthan Valley

Crested Kingfisher, Tirthan Valley (2,700 m)

Blue Whistling Thrush, Sainj 2,000 m

Western Tragopan Male

Monal Male

Koklash Pheasant (Male)

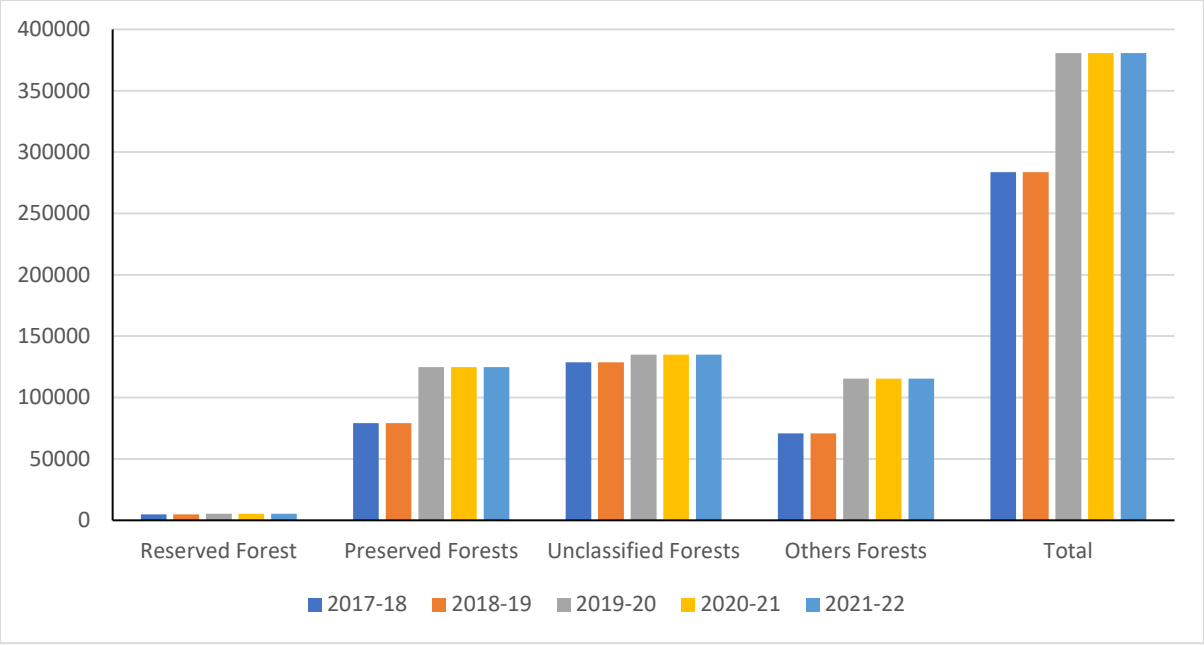
White-crested Kaleej

Insects

Blue Pansy, Junoniaoenone

The Paris Peacock, Papilioparis

Year	Reserved Forest	Preserved Forests	Unclassified Forests	Others Forests	Total
2017-18	4820.11	79100.07	128849.09	70893.89	283664.00
2018-19	4820.11	79100.07	128849.09	70893.89	283664.00
2019-20	5390.73	124858.98	135020.67	115410.02	380680.40
2020-21	5390.73	124858.98	135020.67	115410.02	380680.40
2021-22	5390.73	124858.91	135020.67	115410.34	380680.65



10. Physiography Of The District

Shimla district is located on the southeast border of this state. The district lies between the longitudes 77°00' and 78°19' east and latitudes 30°45' and 31°44' north and is bounded by Mandi and Kullu district in the north, Kinnaur in the east, the state of Uttaranchal and Sirmaur district in the south and by Solan district in the west. The shape of the district is somewhat rectangular with slight bulges on the western side intruding towards Solan district and on the

northern side towards Kullu district. The district has an area of 5,131 sq. kms. out of the total area of 55,673 sq. kms.

The district is entirely mountainous except few small valleys. The district has a number of peaks such as Jakhu in Shimla town, Siah near Chail, Churdhar in Tehsil Chaupal, Chansil in Rohroo Tehsil, Hatto in Kumarsain Tehsil and Shali in Sunni Tehsil. Mostly the terrain is rough. The prevalence of interlocking spurs narrows and steep-sided valleys with high peaks and thick forests of Deodar and Kail throughout the district are the general topographical features of the districts. On the whole, the soils are young and thin, however, these get heavier and comparatively acidic with an increase in altitude. The Shoghi -Taradevi-Shimla-Narkanda Ridge forms a water divide between the Indus and Ganga River systems, The Satluj, Pabbar, Tons and Giri are the principal rivers of the Shimla District. Important glaciers of the district are confined to the Pandra bis area.

Shimla district forms a part of southern Himachal Pradesh. The district lies between the longitudes 77°0' and 78°19' east and latitudes 30c45' and31°44' north and is bounded by Mandi and Kullu district in the north, Kinnaur in the east, the state of Uttaranchal and Sirmaur district in the south and by Solan district in the west. The shape of the district is somewhat rectangular with slight bulges on the western side intruding towards Solan district and on the northern side towards Kullu district. The district has an area of 5,131 Sq. kms. out of the total area of 55,673 Sq. kms.of Himachal Pradesh according to the Surveyor General of India.

The applied mining lease area in general is a part of the Lesser Himalaya. The lesser Himalaya, located in north-western India in the States of Himachal Pradesh and Uttar Pradesh, in north-central India in the State of Sikkim, and in northeastern India in the State of Arunachal Pradesh, ranges from 1,500 to 5,000 meters in height. Terrains of the area are rugged and there is no. of the steep-sided valley and very narrow spurs and thick forest cover mainly of the deodar and kail etc. The soil cover of the entire area is very thin and acidic with the increase in altitude.

Three broad geomorphic units can be identified in the Shimla district as

1. High Structural hill and valleys of Lesser Himalayan zone with Shalli and Chur Peaks (including Shimla town)
2. Fluvial valley e.g., Satluj and Pabbar etc.
3. High valley and hills of Higher Himalaya (parts of Shikari range)

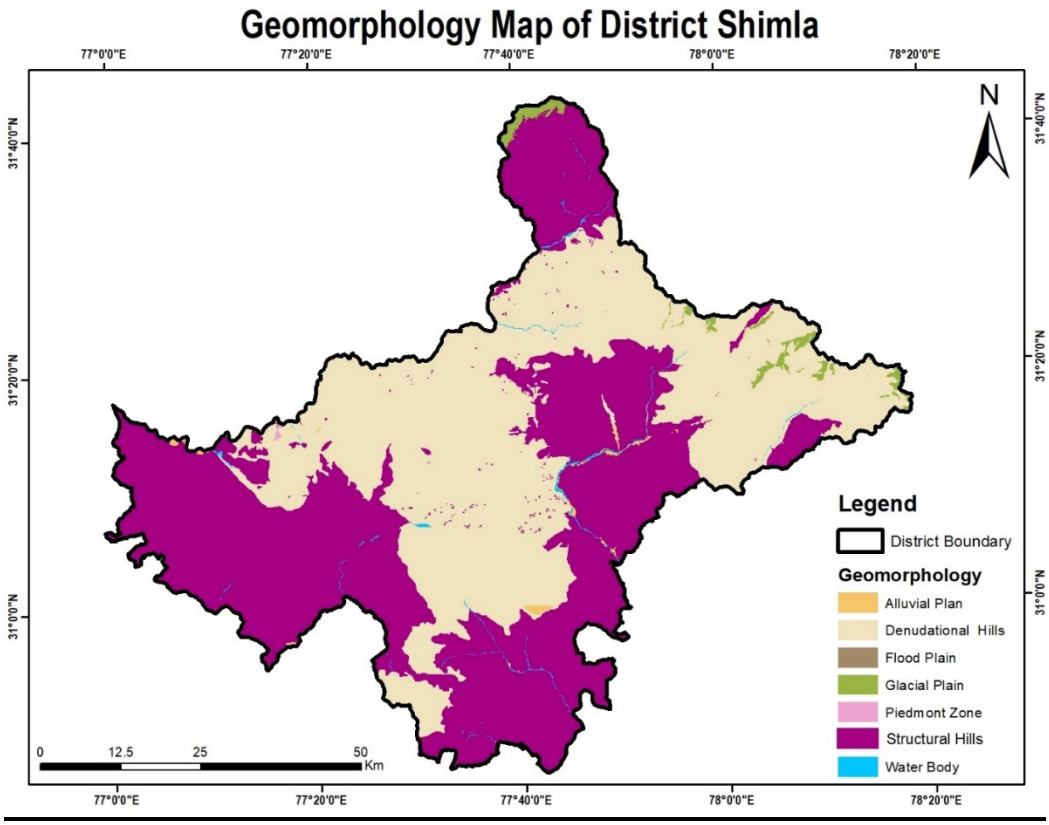


Image Showing Physiography of the District

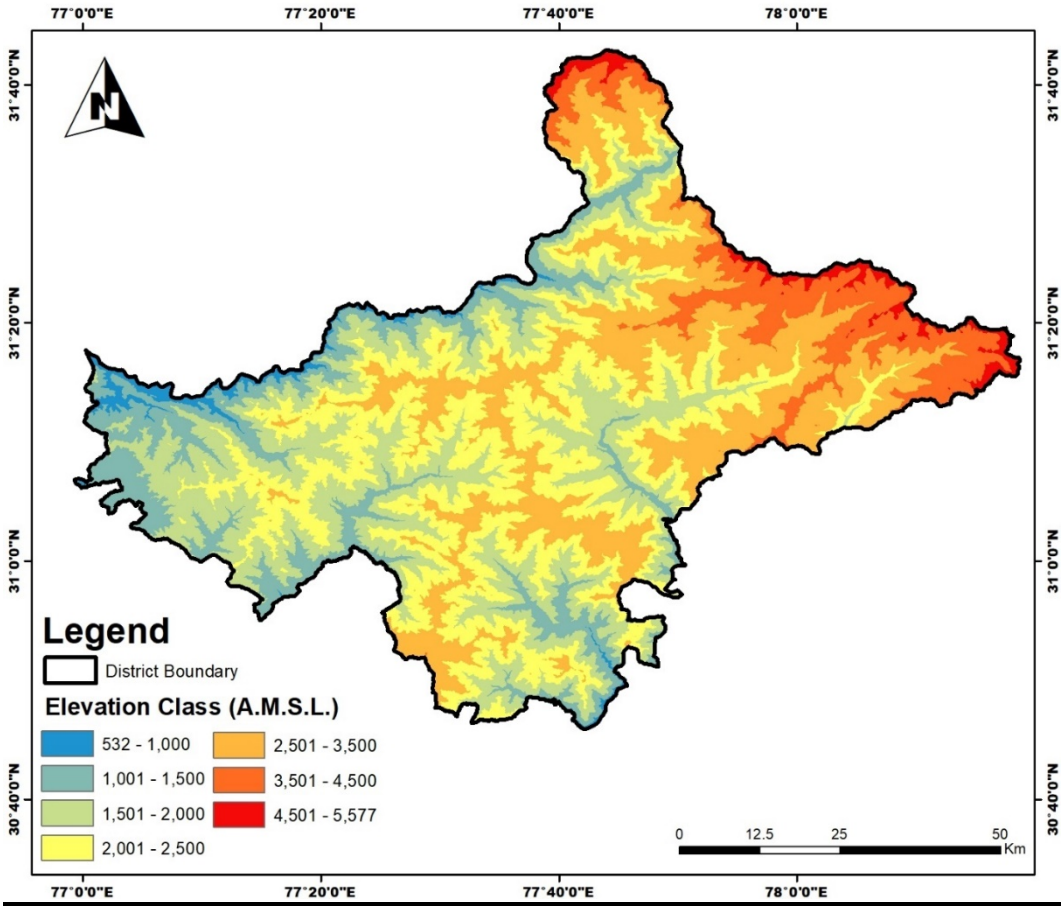


Image showing elevation profile of District

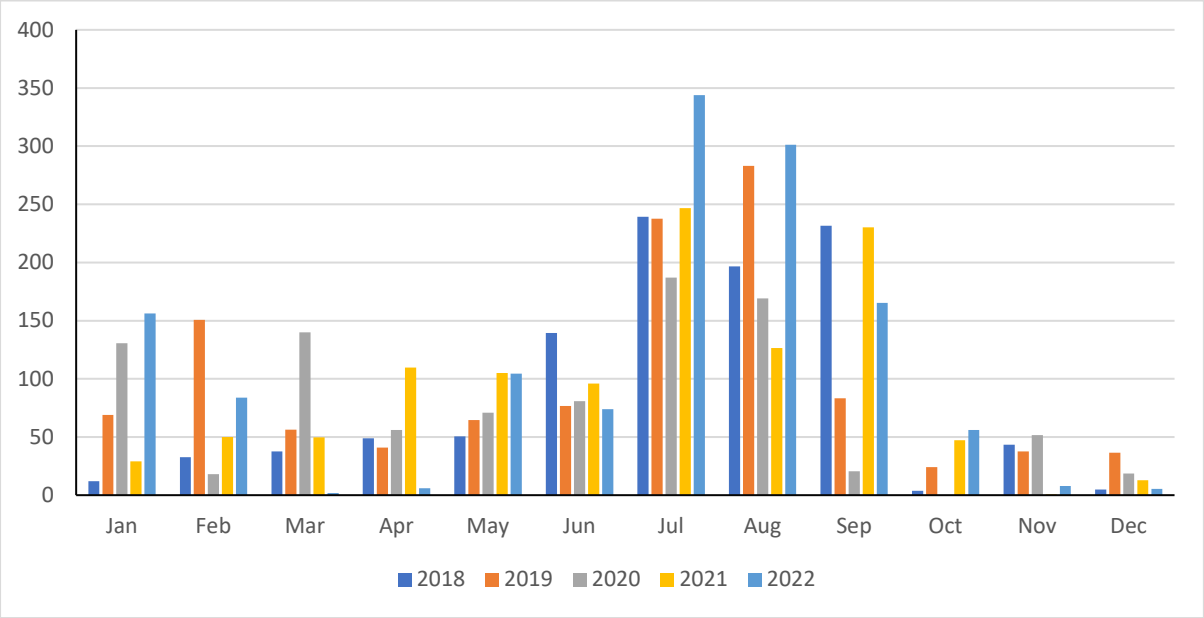
11. Rainfall

Rainfall varies significantly with the altitude of the area. The catchment area receives rainfall due to western disturbances that pass over the northwestern part of the country during the winter months. Significant precipitation in the form of snow is received at higher altitudes and rainfall in valleys is received during the winter month. The rainy season generally starts in mid-July and extends up to mid-September. During winter the rains are scarce and extend from 15th December to 15th February. The following Table shows the quantum of rainfall from the year 2018 to 2022 in the district as per IMD.

Table Showing Rainfall Data In Millimetres Of District Shimla

SHIMLA DISTRICT RAINFALL IN MILLIMETERS (R/F)												
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	RAINFALL (in mm)											
2018	12	32.7	37.6	48.8	50.5	139.3	239.3	196.7	231.7	3.8	43.4	4.8
2019	69	150.6	56.2	40.9	64.6	76.7	237.6	283.1	83.4	24.1	37.5	36.5
2020	130.6	18	140.1	56.1	70.9	80.8	187.1	169.1	20.4	0	51.5	18.7
2021	29	50.1	49.7	109.7	105	95.8	246.7	126.6	230.1	47.2	0.7	12.9
2022	156.3	83.9	1.8	5.9	104.4	73.9	344	301.2	165.3	55.9	7.8	5.5

Source: Meteorological Department, Govt. of India



Graph Showing Annual Rainfall Data Of District Shimla From The Year 2018 To 2022

12. Geology And Mineral Wealth

Himachal Pradesh, as part of the erstwhile Panjab State by virtue of having Shimla as the summer capital of British India, received considerable attention of the Geologists from earliest times. The first authoritative geological work in the Himachal Himalayas was carried out by the Medlicot in 1864 who described the Geology of nearly 18000km2area between the Ravi and the Ganga. His description of the Tertiary and pre Tertiary rocks provides the basic of all future work in the part of Himalayas. Thereafter belt wise mapping covering the major Tectono-stratigraphic belts of Himachal Himalayas was initiated. This enabled extensive coverage of Shali-Shimla, Largi-Rampur, Deoban-Jaunsar-Krol-Tal belt (Srikantia and Sharma, 1976, Bhargava, 1976, Sharma 1977).

Broadly, Himachal Pradesh can be divided in to two major geo-tectonic zones Viz Lesser Himalayan Tectogen in the South and the Tethys Himalayan Tectogen in the North (Srikantia, 1987).These two tectonic zones are juxtaposed with each other along a major tectonic break collectively designed as the Main Central Thrust (MCT).The Lesser Himalayan Tectogen and Tethys Himalayan Tectogen are characterized by diverse stratigraphical, sedimentological, faunal, igneous and tectonic elements so as to imply two alien blocks which are now juxtaposed.

Geologically Himachal Pradesh can be broadly divided into two major geo-tectonic zones viz. the Lesser Himalayan tectogen in the south and the Tethys Himalayan Tectogen in the north. These two tectonic zones are juxtaposed with each other along a major tectonic break collectively designated as Main Central Thrust in the sense defined by Srikantia (1988). Mandi District lying within the Lesser Himalaya and the Siwalik Foothill comprises rocks ranging in age from Proterozoic to Quaternary. The oldest rocks are of undifferentiated Proterozoic age, comprising carbonaceous phyllite, schist, gneiss, quartzite and marble. The Ghoghar Dhar (Undifferentiated Proterozoic age) occurs as an intrusive body within the Chail Group of rock. This granite body is well foliated and composed of gneisses, granite with minor aplite and basic vein lets. The Sundernagar Group of Rocks of Meso- Proterozoic age is represented by quartzite with basic flows. The Shali Group of Rocks (Meso- Proterozoic) comprising limestone, dolomite at places stromatolytic) slate, & quartzite.

The Subathu consists mainly of olive green shale and grey shale. At the top, a band of white quartzite has been taken as the marker defining top of the Subathu sequence. The thick sequence of brackish and fresh water sediments immediately succeeding the fossiliferous marine Subathu are classified as Dharamshala Formation .The Dharamshala Formation are widely exposed in the Mandi par autochthon, further west in the autochthon, these rocks are exposed in the core of the Sarkaghat anticline. The Shiwalik Group of Middle Miocene of Early

Pleistocene age comprises coarse clastic fluviatile deposits of sandstone, clay and conglomerates. The Quaternary sediments (Older Alluvium and Newer Alluvium) along prominent channels consisting of sand, silt, clay, pebbles and cobbles occurring along present channels of Middle to Late Pleistone and Holocene age.

The main type of rock formations that exists in and around the various parts of Shimla District are illustrated as

Jutogh formation

The Jutogh group is defined as a successive of metamorphosed sediments with a definite litho stratigraphic order. The Jutogh group has been divided in to eleven formations as illustrated below.

Lithostratigraphic classification of the Jatogh group:

Formation	Member	Lithology
Jankoti		Schist, Garnetiferous, gneiss, quartzite, local amphibolite and marble.
Chirgaon		Quartzite, quartz Schist, Sporadic, Schist. Local amphibolite and marble.
Rohru		Garnetiferous biotite schist, quartzite, local amphibolites.
Badrol		Quartzite, Quartz schist.
Naura	E	Psamatic gneiss, Quartzite, garnetiferous Staurolite schist.
	D	White marble, amphibolite in Graphitic schist.
	C	Psamatic gneiss, Quartz schist, amphibolite
	B	Mainly Garnetiferous schist and Quartzite, local porphyroblastic gneiss.
	A	Garnetiferous schist and Quartzite with bands of white marble, amphibolite and graphitic schist.
Kanda		Quartzite, Quartz schist and local mica schist.
Taradevi	C	Quartz schist.
	B	Dark grey garnetiferous phyllite.
	A	Carbonaceous phyllite and amphibolites.
Khirki		Mainly pale white to grey quartzite, locally cross bedded, subordinate
Bhotli		Slate, phyllite, schist, quartzite, rare dolomite and amphibolites, local
Manal	B	Pale White to grey quartzite, locally ripple- marked & cross-bedded, interbanded Carbonaceous Limestone.
Panjerli	C	Carbonaceous Phyllite and Schist with limestone and Quartzite.
		Carbonaceous Limestone.

Panjerli, Manal, Kanda and part of Naura formations are exposed in Sirmour District whereas rests of the formations of Jutogh group are mostly exposed in the Upper parts of

Shimla Districts i.e. Jubbal, around Pabber Valley and Chaupal area. In the upper reaches of the Pabbar Valley the Jutogh metasediments especially of the Jankoti formation are associated with granitoid gneisses. It comprises light grey, crudely foliated to non-foliated granitoid in the core, with prophyroblastic gneiss, minor augen and streaky gneiss along the peripheral zone. Panjerli, Manal, Kanda and part of Naura formations are exposed in Sirmour District whereas rests of the formations of Jutogh group are mostly exposed in the Upper parts of Shimla Districts i.e. Jubbal, around Pabbar Valley and Chaupal area. In the upper reaches of the Pabbar Valley the Jutogh metasediments especially of the Jankoti formation are associated with granitoid gneisses. It comprises light grey, crudely foliated to non-foliated granitoid in the core, with prophyroblastic gneiss, minor augen and streaky gneiss along the peripheral zone. In the upper reaches of the Pabbar 'Valley the Jutogh metasediments especially of the Jankoti Formation are associated with granitoid gneisses. In the Northern side of the Shimla District, the Manikaran Quartzite forms a very thick lithostratigraphic unit which has been traced from its closure near Malana in the North to Taklech, South-East of Rampur and is grouped as Rampur Quartzite. The Phyllites are generally Carbonaceous in nature associated with intercalations of Quartz-Mica-Schists with basic rocks. Tectonic window around Rampur is known as "Rampur Window", The Tectonic Sequence in the Rampur Group is as under:

Lithostratigraphic sequence of Rampur group

Group	Formation	Lithology
Rampur	Manikaran	Intrusive Granitoids, Grey and white massive Quartzite with bands of met basalt
	Banjar Volcanic	Met basalt as dark green phyllite, interbed of white massive quartzite, grey phyllite.
	Bhallan	Slate, greenish phyllite schists with interbeds of white flaggy quartzite.

There are many upheavals in the Geological past which changed the shape of old coastline and land-forms. One of such major earth revolutions brought about widespread glaciations. The glaciers descended in the sea and the remnants of these glacial loads are called Blaini Boulder bed. After glaciations the climate gradually warmed up and in the next upheaval the area of the Shimla District was raised above the sea level. During the mountain building, the rocks deposited at the sea bottom were brought to rest over the younger rocks due to thrusting. The rocks were folded and uplifted.

These newly elevated mountains and torrential rivers started chiseling their valleys. Shimla is situated on the Jutogh formations whereas in surroundings, Rocks of Shimla group

are exposed. The Shimla Group is divisible into four formations on the basis of certain characteristic lithological association and order of Super position.

Lithostratigraphic sequence of Shimla group

Formation	Members	Lithology
Sanjauli	Upper	Conglomerate, Arkosie sandstone, protoquartzite, grey and purple shale
	Lower	Greywacke sandstone, greywacke siltstone, shale and siltstone alternation, ortho quartzite
Chhaosa		Shale and Siltstone alternation. greywacke siltstone and orthoquartzite
Kunihar		Shale and Siltstone alternation blue limestone with interbeds.
	D	Thick bedded to platy greyish blue limestone with Interbedded shale.
	C	Massive to bedded limestone-dolomite (local facies)
Basantpur	B	Shale, Siltstone with interbeds of lehticular limestone; Shale is sporadically Carbonaceous, inpersistent band of quatrzite and dolomite
	A	Greyish white quartzite and conglomerate

Shimla Group of rocks is generally free from volcanic element. However, locally dolerite-diabase dykes are seen intruded into the Shimla group of rocks particularly in Basantpur formation in Basantpur-Seoni area. Out of the above four formations of Shimla Group of rocks, only part of two formations is well exposed in Shimla District whereas Shali group of rocks is exposed in the North of Shimla. There are eight formations of Shali group some of which are exposed from Drabala to Kingle along the Basantpur-Kingle road. Lithostratigraphical classification of the Shali Group of rocks is as under:

Lithostratigraphic sequence of Shali group

Formation	Members	Lithology
Shali	Bandla	Green and Purple Coloured Shale, Slate, Siltstone, earthy limestone, thin bedded orthoquartzite inter beds green brecciated rock and a fairly persistent band of white quartzarenite at the base. thin bedded orthoquartzite inter bedded Green brecciated rock Slate, Siltstone, earthy limestone thin bedded orthoquartzite inter
	Parnali	Cherty dolomite, grey limestone and white quartzarenite.

	Makri	Grey, Green, Black and Purple Shales and slates, thin bedded limestone, thin bedded qurtzarenite with or without dolomite
	Tattapani	Grey, Green, Black and Purple Shales and slates, thin bedded limestone, thin bedded qurtzarenite with or without dolomite
	Sorgharwari	Pink and grey cream textured limestone with shale partings
	Khatpul	Massive dolomite with sporadic quartzarenite and a thin red shale band at the base.
	Khaira	Mainly pink and purple also white quatzarenite
	Ropri	Brick red shale and siltstone with grey dolomite in the lower horizon; local development of salt, salt grit and the marly litho-complex ”lokhan”

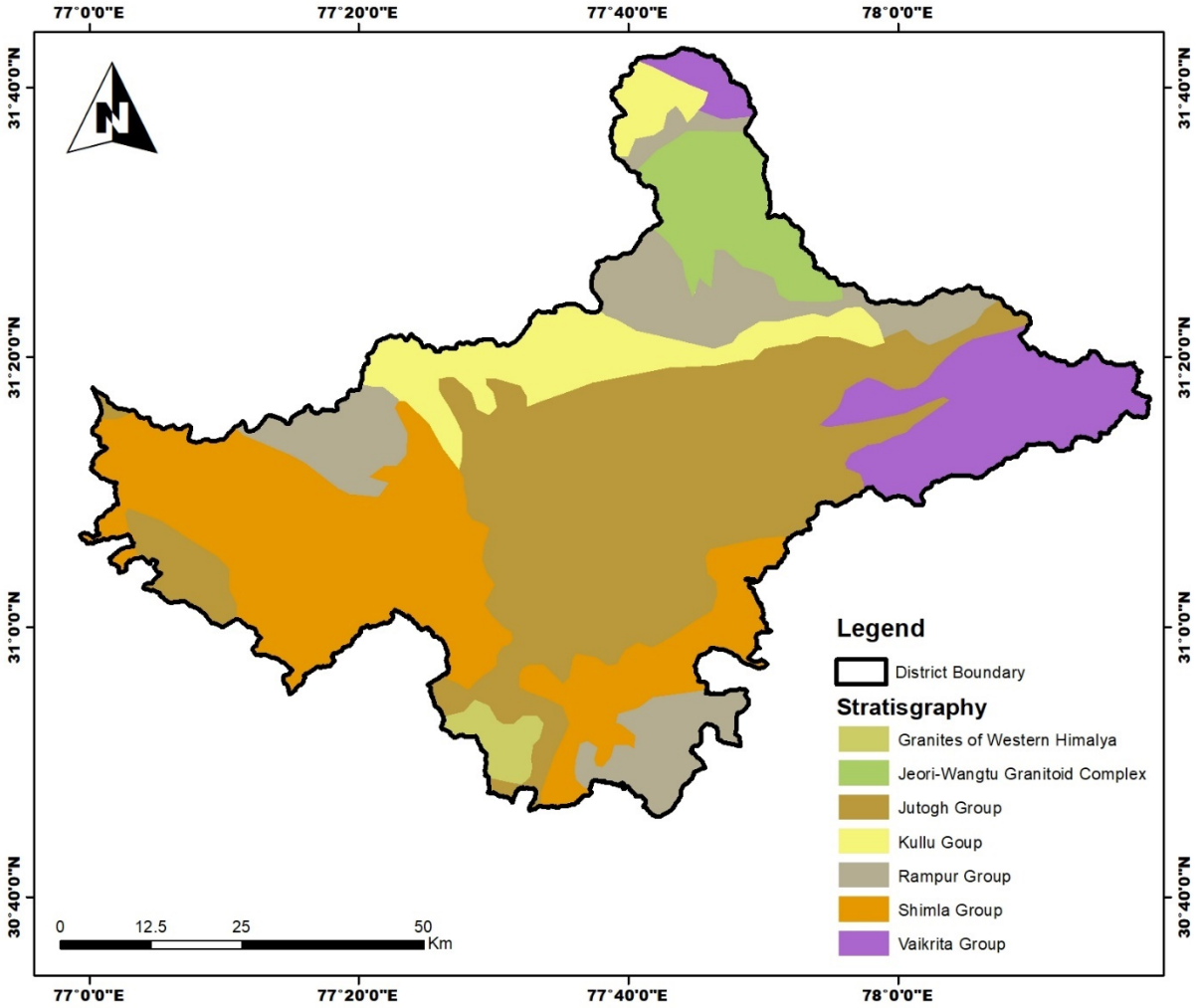


Image Showing Geology of District Shimla

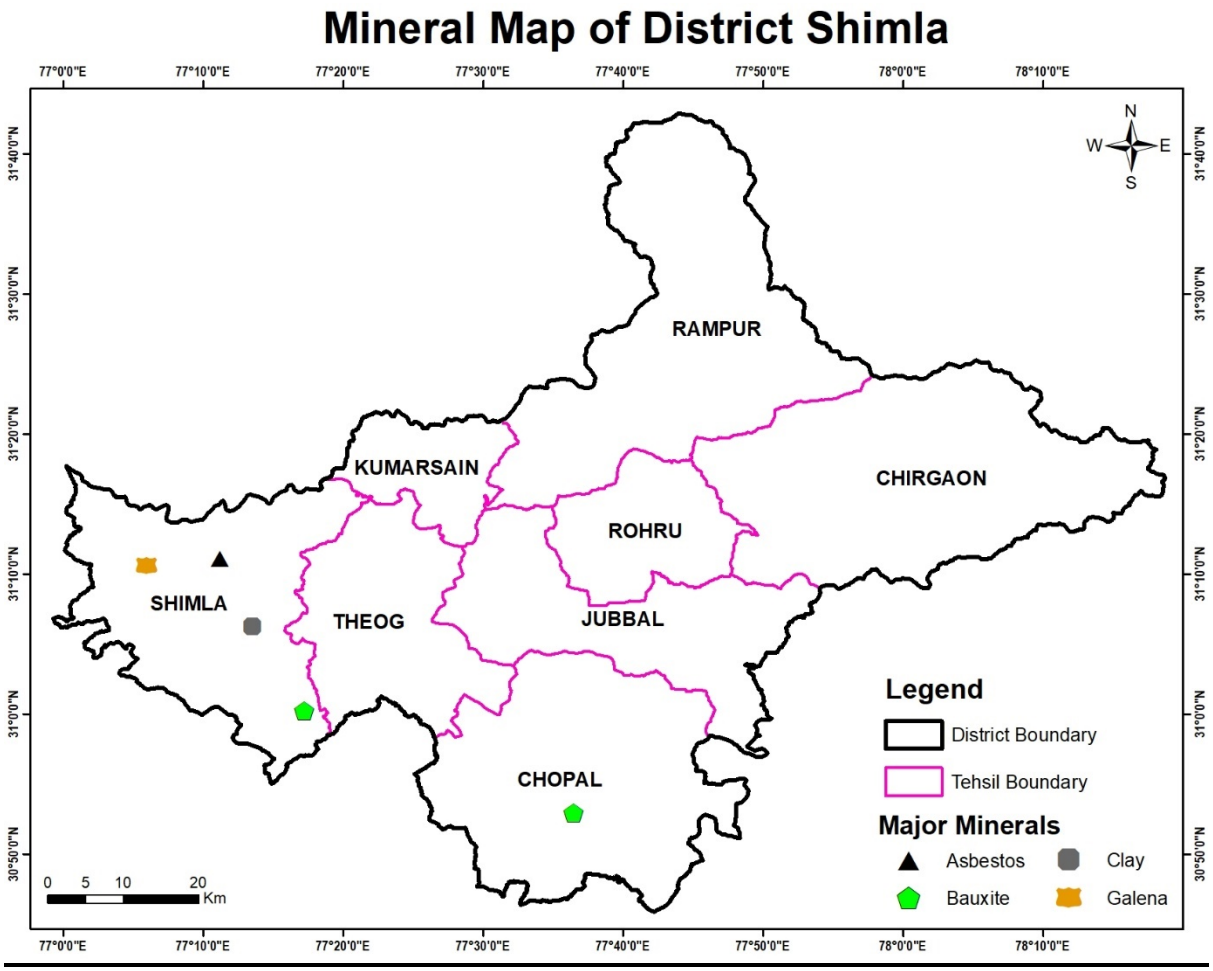


Image Showing Mineral Wealth of District Shimla

Asbestos

Chrysotile asbestos was observed by Captain Palmer in association with a dolerite dyke on the Shali ridge north of Shimla.

Bauxite

(i) Occurrence of bauxite has been reported about one kilometre northeast of village Deharu (30° 49' : 77° 39'). The bauxite forms basal part of the Subathu Formation (Eocene). It occurs at a number of places as localized pockets which range in thickness from one to three metres but generally do not extend laterally beyond 10 metres. The bauxite is earthy pale-grey and brownish in colour and is characterised by well developed pisolitic texture. Sample of bauxite on chemical analysis indicated the presence of Al203 55.10% Si02 24.97%, Fe2O3 1.20% TiO2 5%.

(ii) (ii) In Chapla area (31° 03' : 77° 11'), the bauxite deposit occurs mostly as lateritised rocks at the base of the Palaeocene Kakra rocks. Thickness and length of the zones vary from one to five metres and one to five kilometres respectively. The deposit is low in alumina and high in silica content.

Clays

Clay occurrences in Himachal Pradesh can be broadly classified into (i) lacustrine and fluvial, (ii) residual associated with granite and (iii) associated with the Middle and Upper Siwaliks.

Pottery clays resulting from the decomposition of limestone associated with carbonaceous slates are described as occurring on the spurs of the hills running north from Shimla (31º08'; 77º10'). They have been used for themanufacture of bricks, tiles and coarse pottery.

Galena

Lead Ore in the form of vein occurs in schist and gneiss of JutoghGroup at Darkoti (31° 07' : 77° 36'). At Darkoti the lead mineralization occurs in garnetiferous mice schist, granitic gneiss and quartz- mica schist. Two old workings exists in the area , first the Basag - ka- Nala old mine which is situated one kilometer west of Darkoti village in garnetiferous mica schist trending N 30ºW-S30ºE and dipping 25º NE the second old working is on the right side of nala. The mineralization consist of a vein of massive galena 2.5 cm to 3 cm thick and is associated with quartz vein. The vein occurs along a joint plane which trends N 25º E – S25ºW and dips 75º to SE. The mineralized vein is one metre in length and does not extend in strike. Lead values vary form 0.73% to 12.0% at different localities.

Mineral water

Ten springs occur on the right bank of the Satluj river near Tattapani (31° 14: 77° 50'). The temperature of the water is 57°0. The water is strongly sulphurous with a disagreeable saline taste. It contains chloride and sulphate of soda.

PART II

DISTRICT SURVEY REPORT FOR MINOR MINERALS OTHER THAN SAND MINING OR RIVER BED MINING

(Hill Slope Mining)

1. Introduction:

Minor Minerals (Hill Slopes or riverbeds) are valuable natural resources being the vital raw material for infrastructure, capital goods and basic industries. As a major resource for development, the extraction and management of minerals have to be integrated into the overall strategy of the country's economic development. The exploitation of minerals has to be guided by long-term state goals and perspectives. Just as these goals and perspectives are dynamic and responsive to the changing global economic scenario so also the state minor mineral protection policy has to be dynamic taking into consideration the changing needs of industry in the context of the domestic and global economic environment. To exploit the country's geological potential it is important that scientific and detailed prospecting is carried out in search of its mineral resources.

Mineral deposits in the Shimla District occur largely in the form of rocks (Hill Slope) or River bed material such as Granite, Gneiss, Quartzite, Phyllite, Schist, pegmatite etc. They constitute the vital raw materials for many construction activities (roads and building projects) and hence are a major source for the development of infrastructure in the District and in the nearby towns and villages of the neighbouring State. The Government of India through the Ministry of Environment, Forest & Climate Change (MoEF& CC) has brought out a Notification on 25" July 2018, further amending the Erstwhile Environment Impact Assessment Notification 2006. Based on the amendment introduced by the Ministry, a District Survey Report for minor minerals available in the District is to be prepared separately which shall form the basis for application of environmental clearance and appraisal of projects. Such a Report shall be updated once every five years.

The need for a District Survey Report (DSR) has been necessitated by the Ministry of Environment, Forest and Climate Change (MoEF& CC) vide there Notification No. 125 (Extraordinary, Part II Section 3, Sub-section ii), S.O. 141 (E), dated 15th January 2016. The notification was addressed to bring certain amendments with respect to the EIA notification 2006 and in order to have better control over the legislation. As a part of this notification, the preparation of District Survey Reports has been introduced. Subsequently, MOEF& CC has published Notification No. 3611 (E), dt. 25th July 2018 regarding the inclusion of the ***"Minerals Other than Sand"*** and the format for preparation of the DSR has been specified. Enforcement & Monitoring Guidelines for Sand Mining (EMGSM) January 2020, Issued by MoEF& CC is prepared in consideration of various orders/directions issued by Hon'ble NGT in matters pertaining to illegal sand mining and also based on the reports submitted by expert committees and investigation teams. This DSR has been prepared in conformity with the S O 141 (E), S O 3611 (E) and other sand mining guidelines published by MOEF& CC from time

to time as well as the requirement specified in Himachal Pradesh Minor Mineral Concession Rule, 2015.

The purpose of the District Survey Report (DSR) is to identify the mining potential areas where mining can be allowed; and also to distinguish areas where mining will not be allowed due to proximity to infrastructural structures and installations, areas of erosion. The Preparation of this District Survey Report (DSR) involved both primary and secondary data generation. The primary data generation involved the site inspection, survey, ground truthing etc. while secondary data has been acquired through various authenticated sources and satellite imagery studies. The district survey report of Shimla district also describes the general geographical profile of the district, distribution of natural resources, livelihood, climatic condition and sources of revenue generation.

To ensure systematic mining by way of proper planning, replenishment and reclamation of the area, the period of lease shall be 5 years. Extension can be considered only after Joint Inspection by Sub-Divisional Committee and keeping in view its recommendations, depending upon the availability of raw material and requirement of mineral based industry under Himachal Pradesh Minor Minerals (Concession) and Minerals (Prevention of Illegal. Mining, Transportation and Storage) Rules, 2015.

2. Overview Of Mining Activity In The District

Hillslopes are one of the dominant landform features on Earth. Many types of processes act to create, modify, and attenuate slopes. Most of the districts of Himachal Pradesh have the mightiest mountain ranges having the Highest elevation of 6,813 m (22,352 ft) and the Lowest elevation of 232 m (761 ft). Shimla district is located on the southeast border of this state. The district lies between the longitudes 77°00' and 78°19' east and latitudes 30°45' and 31°44' north and is bounded by Mandi and Kullu district in the north, Kinnaur in the east, the state of Uttaranchal and Sirmaur district in the south and by Solan district in the west. The shape of the district is somewhat rectangular with slight bulges on the western side intruding towards Solan district and on the northern side towards Kullu district. The district has an area of 5,131 sq. kms. out of the total area of 55,673 sq. kms.

Surface Hill slope mining makes up a huge percentage of mining projects in the Shimla district. The minor minerals available in the district are sand, clay, slate and Rough Stone/Project Stone. Hence on the basis of available minerals no major industrial enterprises can be set up in the district.

Hill slope mining and terrace mining are two methods employed in the extraction of minerals and resources from sloped or hilly terrain. Here's a brief note on each:

Hill Slope Mining:

Hill slope mining involves the extraction of minerals or resources from the sides of hills. This method is commonly used when the mineral deposit extends horizontally along the slope.

The process usually includes the following steps:

1. **Exploration:** Identifying the location and extent of the mineral deposit.
2. **Excavation:** Breaking the rock into manageable fragments. Mining activities are carried out after the formation of benches of usually 6mX6m, with an angle of repose of 45º.
3. **Transportation:** Moving the extracted material down the slope, often using conveyors or trucks.
4. **Processing:** Refining and processing the raw material to extract the desired minerals. The extracted raw material i.e., stone can be directly sold in the open market or can be used as a captive use for stone crusher units which are crushed in the form of angular grit.

Hill slope mining can be challenging due to issues such as soil erosion, landslide risks, and environmental concerns. Proper planning and environmental safeguards are essential to mitigate the negative impacts on the ecosystem.

Terrace deposits, in a geological context, refer to accumulations of sediments, minerals, or other materials that have been deposited on flat, elevated surfaces known as terraces. Terraces are often formed by the erosion and weathering of landscapes over time, and they can be found along river valleys, coastal areas, or on the slopes of hills and mountains. These deposits can be of various types, including sediments, alluvium, or even mineral deposits, depending on the geological processes that led to their formation. Here are a few examples:

Fluvial Terraces:

These terraces form along river valleys and are the result of river downcutting and lateral erosion over time. The sediments deposited on these terraces can include gravel, sand, and silt. Fluvial terraces are often indicative of changes in the river's course or base level.

Alluvial Terraces:

Alluvial terraces are associated with the floodplains of rivers. As rivers meander and change their course, they leave behind elevated terraces with deposits of alluvial materials. These terraces can contain valuable minerals and are often targeted in mining operations.

Mineral Deposits on Terraces:

In a mining context, terrace deposits specifically refer to mineral accumulations found on terraced slopes or elevated flat surfaces. These deposits can include valuable minerals like gold, silver, copper, or others. Terrace mining may be employed to extract these minerals from

the flat benches or terraces created on the slopes.

Understanding terrace deposits is crucial in geological and mining studies, as they provide insights into past environmental conditions, sedimentation processes, and the history of the landscape. Geologists and mining professionals analyse terrace deposits to determine the potential for valuable resources and to plan appropriate extraction methods while considering environmental and safety factors.

Terrace Mining:

Terrace mining, also known as bench mining, is a method of extracting minerals from a series of flat benches or terraces created on the sides of a hill or mountain. This technique is employed when the mineral deposit is found in layers parallel to the surface. The process typically involves the following stages:

Cutting Benches:

Creating a series of flat, horizontal steps or benches on the slope. Mining activities are carried out after the formation of benches of usually 6mX6m, with an angle of repose of 45º.

Excavation: The excavation process is done manually or semi-mechanical methods may be applied such as poclain or JCB after taking permission from the competent authorities.

Hauling: Transporting the mined material from each terrace to a collection point.

Processing: Refining and processing the extracted material to obtain the desired minerals.

Terrace mining helps minimize the environmental impact compared to some other methods as it reduces the risk of soil erosion and landslide occurrences. However, proper land reclamation measures must be implemented to restore the landscape post-mining.

Both hill slope mining and terrace mining have environmental and safety considerations. Sustainable practices and adherence to regulations are crucial to minimize the ecological footprint and ensure the safety of workers and surrounding communities. Additionally, community engagement and consultation are essential to address concerns and incorporate local perspectives into the mining operations.

3. General Profile Of The District

Shimla district is located on the southeast border of this state. The district lies between the longitudes 77°00' and 78°19' east and latitudes 30°45' and 31°44' north and is bounded by Mandi and Kullu district in the north, Kinnaur in the east, the state of Uttaranchal and Sirmaur district in the south and by Solan district in the west. The shape of the district is somewhat rectangular with slight bulges on the western side intruding towards Solan district and on the northern side towards Kullu district. The district has an area of 5,131 sq. kms. out of the total area of 55,673 sq. kms.

The district is entirely mountainous except few small valleys. The district has a number of peaks such as Jakhu in Shimla town, Siah near Chail, Churdhar in Tehsil Chaupal, Chansil in Rohroo Tehsil, Hatto in Kumarsain Tehsil and Shali in Sunni Tehsil. Mostly the terrain is rough. The prevalence of interlocking spurs narrows and steep-sided valleys with high peaks and thick forests of Deodar and Kail throughout the district are the general topographical features of the districts. On the whole, the soils are young and thin, however, these get heavier and comparatively acidic with an increase in altitude. The Shoghi -Taradevi-Shimla-Narkanda Ridge forms a water divide between the Indus and Ganga River systems, The Satluj, Pabbar, Tons and Giri are the principal rivers of the Shimla District. Important glaciers of the district are confined to the Pandra bis area. Shimla district forms a part of southern Himachal Pradesh. The district lies between the longitudes 77°0' and 78°19' east and latitudes 30c45' and31°44' north and is bounded by Mandi and Kullu district in the north, Kinnaur in the east, the state of Uttaranchal and Sirmaur district in the south and by Solan district in the west. The shape of the district is somewhat rectangular with slight bulges on the western side intruding towards Solan district and on the northern side towards Kullu district. The district has an area of 5,131 Sq. kms. out of the total area of 55,673 Sq. kms.of Himachal Pradesh according to the Surveyor General of India.

The applied mining lease area in general is a part of the Lesser Himalaya. The lesser Himalaya, located in north-western India in the States of Himachal Pradesh and Uttar Pradesh, in north-central India in the State of Sikkim, and in northeastern India in the State of Arunachal Pradesh, ranges from 1,500 to 5,000 meters in height. Terrains of the area are rugged and there is no. of the steep-sided valley and very narrow spurs and thick forest cover mainly of the deodar and kail etc. The soil cover of the entire area is very thin and acidic with the increase in altitude.

Three broad geomorphic units can be identified in the Shimla district as

1. High Structural hill and valleys of Lesser Himalayan zone with Shalli and Chur Peaks (including Shimla town)
2. Fluvial valley e.g., Satluj and Pabbar etc.
3. High valley and hills of Higher Himalaya (parts of Shikari range)

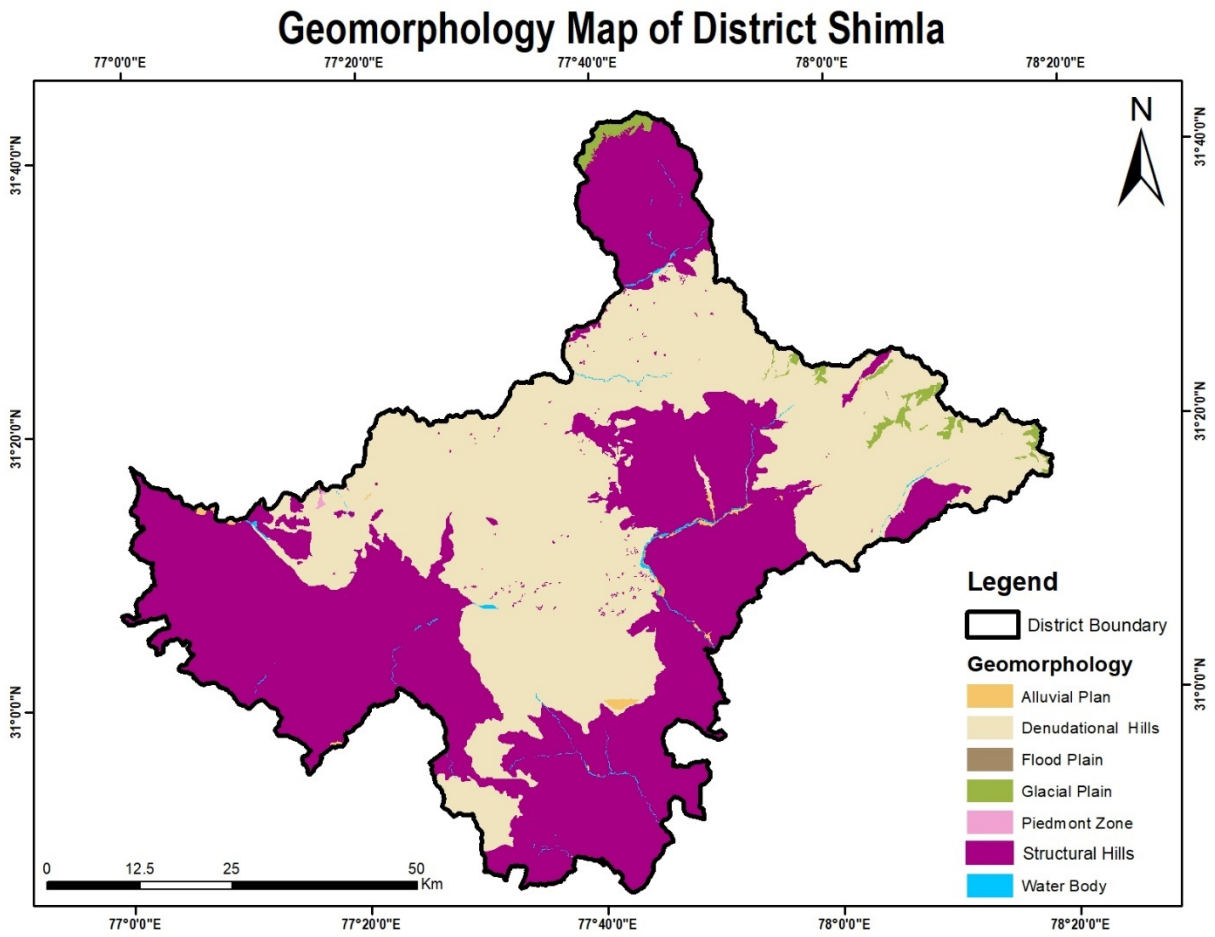


Image Showing Physiography of the District

4. Geology Of The District

Himachal Pradesh, as part of the erstwhile Panjab State by virtue of having Shimla as the summer capital of British India, received considerable attention of the Geologists from earliest times. The first authoritative geological work in the Himachal Himalayas was carried out by the Medlicot in 1864 who described the Geology of nearly 18000km2area between the Ravi and the Ganga. His description of the Tertiary and pre Tertiary rocks provides the basic of all future work in the part of Himalayas. Thereafter belt wise mapping covering the major Tectono-stratigraphic belts of Himachal Himalayas was initiated. This enabled extensive coverage of Shali-Shimla, Largi-Rampur, Deoban-Jaunsar-Krol-Tal belt (Srikantia and Sharma, 1976, Bhargava, 1976, Sharma 1977).

Broadly, Himachal Pradesh can be divided in to two major geo-tectonic zones Viz Lesser Himalayan Tectogen in the South and the Tethys Himalayan Tectogen in the North (Srikantia, 1987).These two tectonic zones are juxtaposed with each other along a major tectonic break collectively designed as the Main Central Thrust (MCT).The Lesser Himalayan Tectogen and Tethys Himalayan Tectogen are characterized by

diverse stratigraphical, sedimentological, faunal, igneous and tectonic elements so as to imply two alien blocks which are now juxtaposed.

Geologically Himachal Pradesh can be broadly divided into two major geo-tectonic zones viz. the Lesser Himalayan tectogen in the south and the Tethys Himalayan Tectogen in the north. These two tectonic zones are juxtaposed with each other along a major tectonic break collectively designated as Main Central Thrust in the sense defined by Srikantia (1988). Mandi District lying within the Lesser Himalaya and the Siwalik Foothill comprises rocks ranging in age from Proterozoic to Quaternary. The oldest rocks are of undifferentiated Proterozoic age, comprising carbonaceous phyllite, schist, gneiss, quartzite and marble. The Ghoghar Dhar (Undifferentiated Proterozoic age) occurs as an intrusive body within the Chail Group of rock. This granite body is well foliated and composed of gneisses, granite with minor aplite and basic vein lets. The Sundernagar Group of Rocks of Meso- Proterozoic age is represented by quartzite with basic flows. The Shali Group of Rocks (Meso- Proterozoic) comprising limestone, dolomite at places stromatolytic) slate, & quartzite.

The Subathu consists mainly of olive green shale and grey shale. At the top, a band of white quartzite has been taken as the marker defining top of the Subathu sequence. The thick sequence of brackish and fresh water sediments immediately succeeding the fossiliferous marine Subathu are classified as Dharamshala Formation .The Dharamshala Formation are widely exposed in the Mandi par autochthon, further west in the autochthon, these rocks are exposed in the core of the Sarkaghat anticline. The Shiwalik Group of Middle Miocene of Early Pleistocene age comprises coarse clastic fluviatile deposits of sandstone, clay and conglomerates. The Quaternary sediments (Older Alluvium and Newer Alluvium) along prominent channels consisting of sand, silt, clay, pebbles and cobbles occurring along present channels of Middle to Late Pleistone and Holocene age.

The main type of rock formations that exists in and around the various parts of Shimla District are illustrated as:

Jutogh formation

The Jutogh group is defined as a successive of metamorphosed sediments with a definite litho stratigraphic order. The Jutogh group has been divided in to eleven formations as illustrated below.

Lithostratigraphic classification of the Jatogh group:

Formation	Member	Lithology
Jankoti		Schist, Garnetiferous, gneiss, quartzite, local amphibolite and marble.
Chirgaon		Quartzite, quartz Schist, Sporadic, Schist. Local amphibolite and marble.
Rohru		Garnetiferous biotite schist, quartzite, local amphibolites.
Badrol		Quartzite, Quartz schist.
Naura	E	Psamatic gneiss, Quartzite, garnetiferous Staurolite schist.
	D	White marble, amphibolite in Graphitic schist.
	C	Psamatic gneiss, Quartz schist, amphibolite
	B	Mainly Garnetiferous schist and Quartzite, local porphyroblastic gneiss.
	A	Garnetiferous schist and Quartzite with bands of white marble, amphibolite and graphitic schist.
Kanda		Quartzite, Quartz schist and local mica schist.
Taradevi	C	Quartz schist.
	B	Dark grey garnetiferous phyllite.
	A	Carbonaceous phyllite and amphibolites.
Khirki		Mainly pale white to grey quartzite, locally cross bedded, subordinate
Bhotli		Slate, phyllite, schist, quartzite, rare dolomite and amphibolites, local
Manal	B	Pale White to grey quartzite, locally ripple- marked & cross-bedded, interbanded Carbonaceous Limestone.
Panjerli	C	Carbonaceous Phyllite and Schist with limestone and Quartzite.
		Carbonaceous Limestone.

Panjerli, Manal, Kanda and part of Naura formations are exposed in Sirmour District whereas rests of the formations of Jutogh group are mostly exposed in the Upper parts of Shimla Districts i.e. Jubbal, around Pabber Valley and Chaupal area. In the upper reaches of the Pabbar Valley the Jutogh metasediments especially of the Jankoti formation are associated with granitoid gneisses. It comprises light grey, crudely foliated to non-foliated granitoid in the core, with prophyroblastic gneiss, minor augen and streaky gneiss along the peripheral zone.

Panjerli, Manal, Kanda and part of Naura formations are exposed in Sirmour District whereas rests of the formations of Jutogh group are mostly exposed in the Upper parts of Shimla Districts i.e. Jubbal, around Pabber Valley and Chaupal area. In the upper reaches of the Pabbar Valley the Jutogh metasediments especially of the Jankoti formation are associated with granitoid gneisses. It comprises light grey, crudely foliated to non-foliated granitoid in the core, with prophyroblastic gneiss, minor augen

and streaky gneiss along the peripheral zone. In the upper reaches of the Pabbar 'Valley the Jutogh metasediments especially of the Jankoti Formation are associated with granitoid gneisses. In the Northern side of the Shimla District, the Manikaran Quartzite forms a very thick lithostratigraphic unit which has been traced from its closure near Malana in the North to Taklech, South-East of Rampur and is grouped as Rampur Quartzite. The Phyllites are generally Carbonaceous in nature associated with intercalations of Quartz-Mica-Schists with basic rocks. Tectonic window around Rampur is known as "Rampur Window", The Tectonic Sequence in the Rampur Group is as under:

Lithostratigraphic sequence of Rampur group

Group	Formation	Lithology
Rampur	Manikaran	Intrusive Granitoids, Grey and white massive Quartzite with bands of met basalt
	Banjar Volcanic	Met basalt as dark green phyllite, interbed of white massive quartzite, grey phyllite.
	Bhallan	Slate, greenish phyllite schists with interbeds of white flaggy quartzite.

There are many upheavals in the Geological past which changed the shape of old coastline and land-forms. One of such major earth revolutions brought about widespread glaciations. The glaciers descended in the sea and the remnants of these glacial loads are called Blaini Boulder bed. After glaciations the climate gradually warmed up and in the next upheaval the area of the Shimla District was raised above the sea level. During the mountain building, the rocks deposited at the sea bottom were brought to rest over the younger rocks due to thrusting. The rocks were folded and uplifted. These newly elevated mountains and torrential rivers started chiseling their valleys. Shimla is situated on the Jutogh formations whereas in surroundings, Rocks of Shimla group are exposed. The Shimla Group is divisible into four formations on the basis of certain characteristic lithological association and order of Super position.

Lithostratigraphic sequence of Shimla group

Formation	Members	Lithology
Sanjauli	Upper	Conglomerate, Arkosie sandstone, protoquartzite, grey and purple shale

	Lower	Greywacke sandstone, greywacke siltstone, shale and siltstone alternation, ortho quartzite
Chhaosa		Shale and Siltstone alternation. greywacke siltstone and orthoquartzite
Kunihar		Shale and Siltstone alternation blue limestone with interbeds.
	D	Thick bedded to platy greyish blue limestone with Interbedded shale.
	C	Massive to bedded limestone-dolomite (local facies)
Basantpur	B	Shale, Siltstone with interbeds of lehticular limestone; Shale is sporadically Carbonaceous, inpersistent band of quatrzite and dolomite
	A	Greyish white quartzite and conglomerate

Shimla Group of rocks is generally free from volcanic element. However, locally dolerite-diabase dykes are seen intruded into the Shimla group of rocks particularly in Basantpur formation in Basantpur-Seoni area. Out of the above four formations of Shimla Group of rocks, only part of two formations is well exposed in Shimla District whereas Shali group of rocks is exposed in the North of Shimla. There are eight formations of Shali group some of which are exposed from Drabala to Kingle along the Basantpur-Kingle road. Lithostratigraphical classification of the Shali Group of rocks is as under:

Lithostratigraphic sequence of Shali group

Formation	Members	Lithology
Shali	Bandla	Green and Purple Coloured Shale, Slate, Siltstone, earthy limestone, thin bedded orthoquartzite inter beds green brecciated rock and a fairly persistent band of white quartzarenite at the base. thin bedded orthoquartzite inter bedded Green brecciated rock Slate, Siltstone, earthy limestone thin bedded orthoquartzite inter
	Parnali	Cherty dolomite, grey limestone and white quartzarenite.
	Makri	Grey, Green, Black and Purple Shales and slates, thin bedded limestone, thin bedded qurtzarenite with or without dolomite
	Tattapani	Grey, Green, Black and Purple Shales and slates, thin bedded limestone, thin bedded qurtzarenite with or without dolomite
	Sorgharwari	Pink and grey cream textured limestone with shale partings

	Khatpul	Massive dolomite with sporadic quartzarenite and a thin red shale band at the base.
	Khaira	Mainly pink and purple also white quatzarenite
	Ropri	Brick red shale and siltstone with grey dolomite in the lower horizon; local development of salt, salt grit and the marly litho-complex ”lokhan”

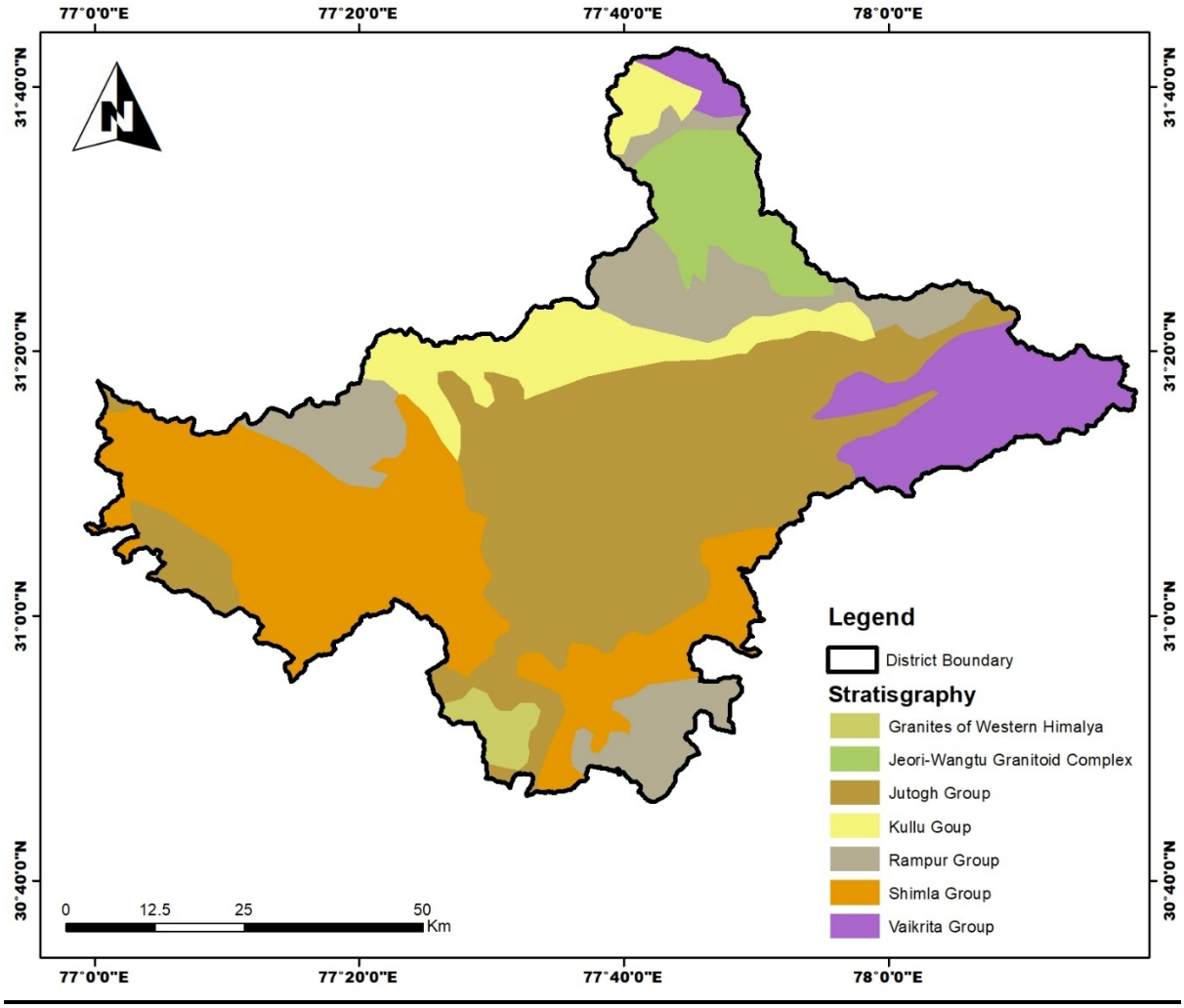


Image Showing Geology of District Shimla

5. Drainage Of Irrigation Pattern

Irrigation Overview:

- **Current Fallow, Long-Term Fallow, and Culturable Waste Land:** These make up 1.32%, 0.48%, and 2.81% of the total geographical area, respectively, which is relatively low compared to other states.
- **Irrigated Area:** Out of the total 55.7 lakh hectares (ha) of land, only 1.1 lakh ha is irrigated.
- **Irrigation Sources:** Of the irrigated area, 7.14% is through canals, 7.14% through wells, and 85.72% through other sources like kuhls, tube wells, and storage tanks.
- **Irrigation Potential:** The state's ultimate irrigation potential is about 335,000 ha. Major and medium projects could irrigate 50,000 ha, while minor schemes could cover the remaining 285,000 ha.

Agricultural Context:

- **Dependence on Rainfall:** Agriculture largely relies on timely rainfall due to insufficient irrigation infrastructure.
- **Rainfall and Irrigation:** The state has four seasons, with 50-70% of rainfall occurring during the monsoon (June to September). Currently, 78% of the cropped area depends on rainfall, with only 22% having assured irrigation.
- **Recent Initiatives:** New schemes like the “Flow Irrigation Scheme” and “Solar Irrigation Scheme” have been introduced, alongside the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) to enhance water usage. The state is also promoting rainwater harvesting and efficient irrigation technologies.

Regulatory Measures:

- **Water Regulation:** The Himachal Pradesh Water Regulatory Authority Act, 2011, aims to manage water resources sustainably, involving communities and local bodies in water management and infrastructure maintenance.

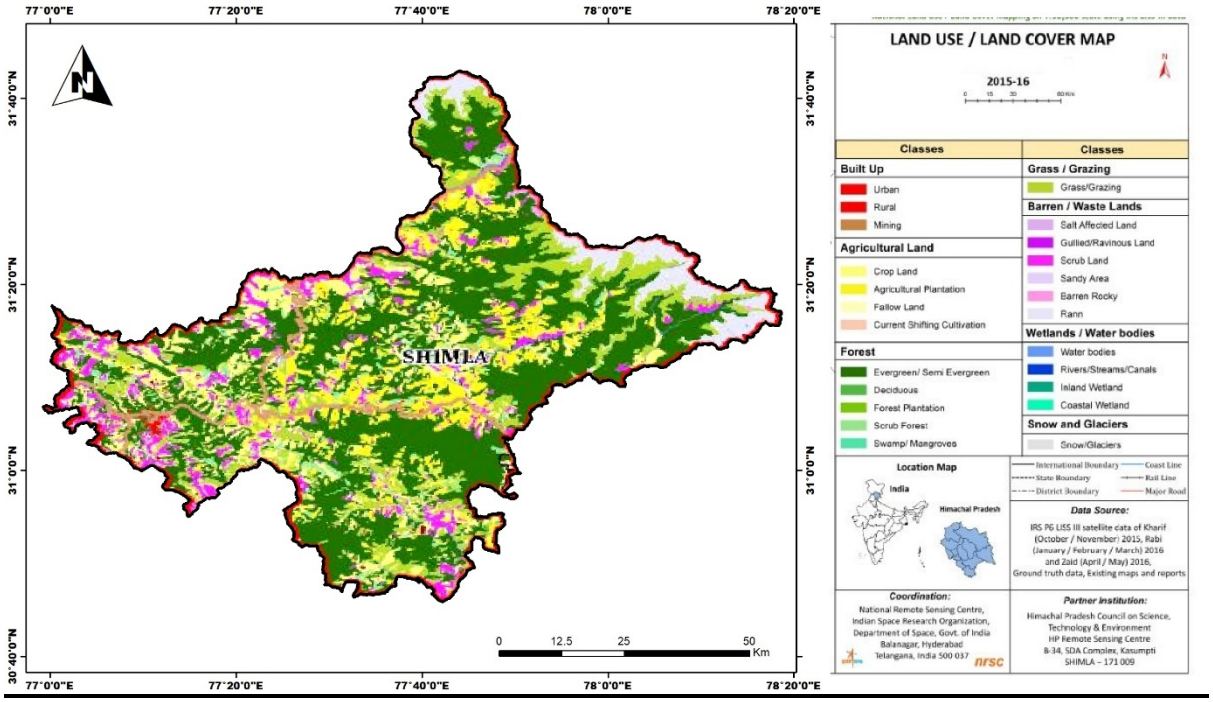
Rainfall Statistics:

- **Average Rainfall:** The average rainfall is 1418.1 mm, slightly above the normal of 1378.1 mm. Current rainy days average 63.3, compared to the normal 71.1.
- **Rainfall Variability:** Rainfall is categorized as normal, excess, deficient, or scanty based on deviations from the average.

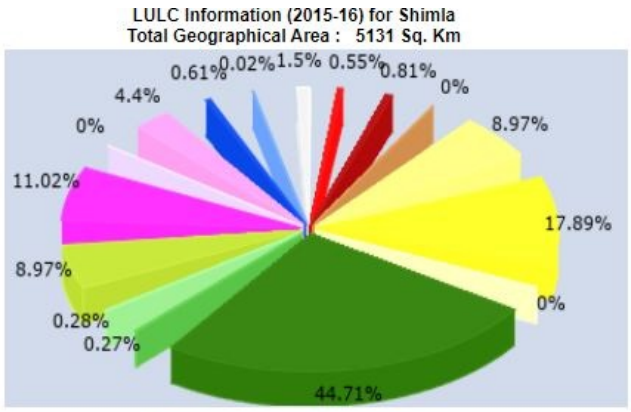
Overall, while the state has low irrigation coverage and heavy dependence on rainfall, new schemes and regulatory measures are being implemented to improve water management and agricultural productivity.

6. Land Utilization Pattern In The District

The economy of Shimla district is predominately agrarian as around 79 per cent of the total population is dependent on agriculture and activities allied to it for earning their livelihood. The moisture retention capacity of the area is poor due mainly to the fact the bedrock are argillaceous and the land the uneven. The crops usually face moisture stress during the remaining period of the year due to inadequate and irregular rainfall. The irrigation facilities are provided by lifting water from streams, shallow dug wells and medium to deep tube wells in the valley area.



Land Use Land Cover Map of Shimla District



LULC Class	Area (Sq.Km)	LULC Class	Area (Sq.Km)
Builtup,Urban	28.17	Builtup,Rural	41.76
Builtup,Mining	0.13	Agriculture,Crop land	460.09
Agriculture,Plantation	917.79	Agriculture,Fallow	0.04
Forest,Evergreen/ Semi evergreen	2293.88	Forest,Deciduous	14.09
Forest,Scrub Forest	14.23	Grass/Grazing	460.3
Barren/unculturable/ Wastelands, Scrub land	565.48	Barren/unculturable/ Wastelands, Sandy area	0.06
Barren/unculturable/ Wastelands, Barren rocky	225.75	Wetlands/Water Bodies, River/Stream/canals	31.14
Wetlands/Water Bodies, Reservoir/Lakes/Ponds	1.2	Snow and Glacier	76.89

Land Use Land Cover Statistics of District Shimla

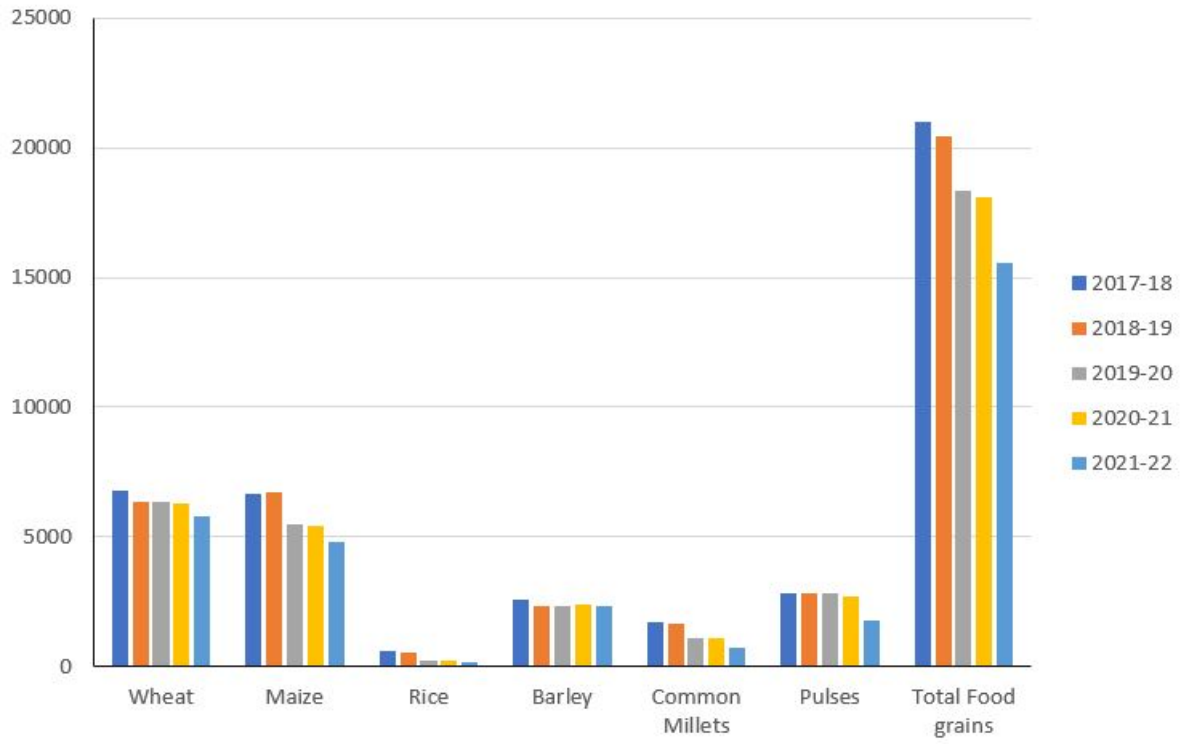
7.1 Agriculture

There is no involvement of agricultural land where mining is proposed, however, in the district, the agricultural and horticultural practices of the region vary from other parts of India due to a variety of factors. The most important one is, of course, the unique climate and landscape of the Himalayas. The mountainous territory strongly influences both techniques and crops. Most agriculture takes place in the form of terrace cultivation, with small strips of mountain slopes that had been more or less levelled out to allow cultivation. The quality of the soil is less than optimal with few nutrients and many small stones and rocky patches. Further, the altitude leads to a harsh climate. While in the valleys with an altitude of around 1500 m above sea level, the cultivation can still take place most of the year; it is reduced in the summer months in regions above 2500 m. Yet, the people there particularly depend on agriculture for survival, largely because the remote locality of their villages denies opportunities in other fields. The area is purely rain-fed, which creates difficulties if the monsoon and snowfall turn out weak. Problems of accessibility and transport are further crucial aspects of the farming in Shimla district.The main cereals grown are wheat, maize, rice, and barley in the district.

Table showing area under Different Crops in Hectares

Year	Wheat	Maize	Rice	Barley	Common Millets	Pulses	Total Food grains
2017-18	6758	6631	577	2556	1713	2797	21032
2018-19	6329	6708	563	2340	1659	2826	20425
2019-20	6329	5491	240	2340	1072	2850	18322
2020-21	6303	5407	217	2380	1070	2698	18075
2021-22	5767	4794	155	2350	726	1751	15543

Source: Directorate of Land Records, HP

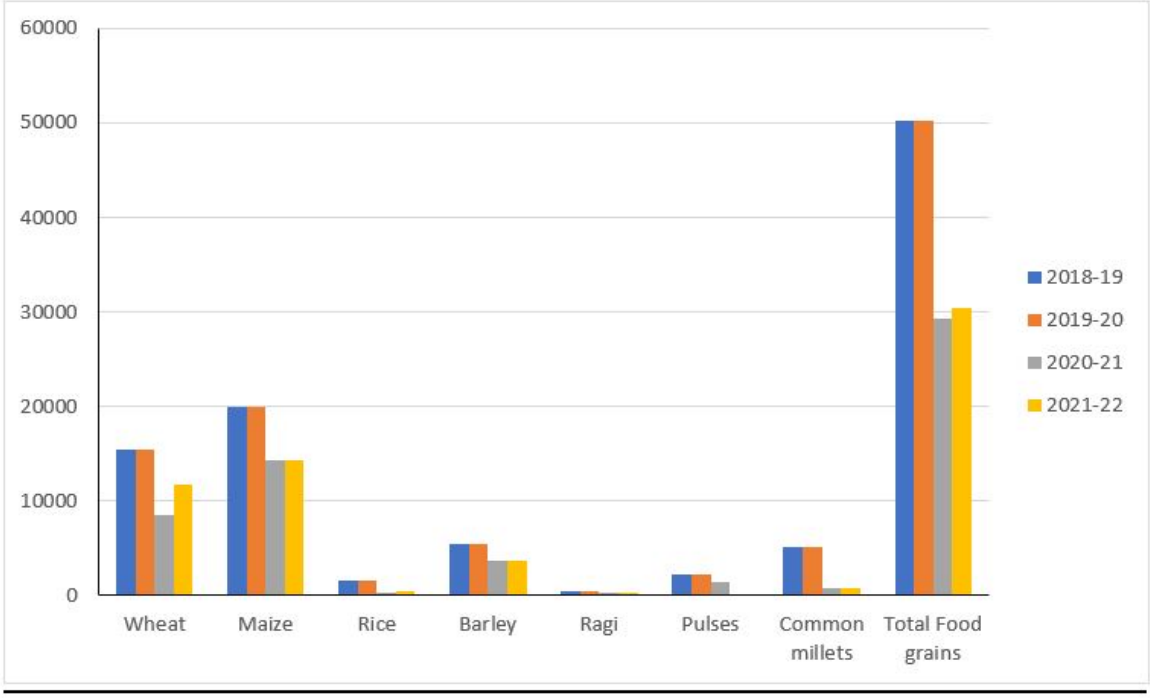


Graph showing Area under Different Crops in Hectares

Table showing production under Different Crops in Metric Tonnes

Year	Wheat	Maize	Rice	Barley	Ragi	Pulses	Common millets	Total Food grains
2017-18	NA	NA	NA	NA	NA	NA	NA	NA
2018-19	15365	19974	1643	5381	485	2286	5141	50275
2019-20	15365	19974	1643	5381	485	2286	5141	50275
2020-21	8544	14328	343	3617.6	265	1376	775.2	29248.8
2021-22	11722	14328	489.25	3617.6	265	NA	757	30469.85

Source: Directorate of Land Records, HP



Graph showing Production under Different Crops in Hectares

7.2 Horticulture

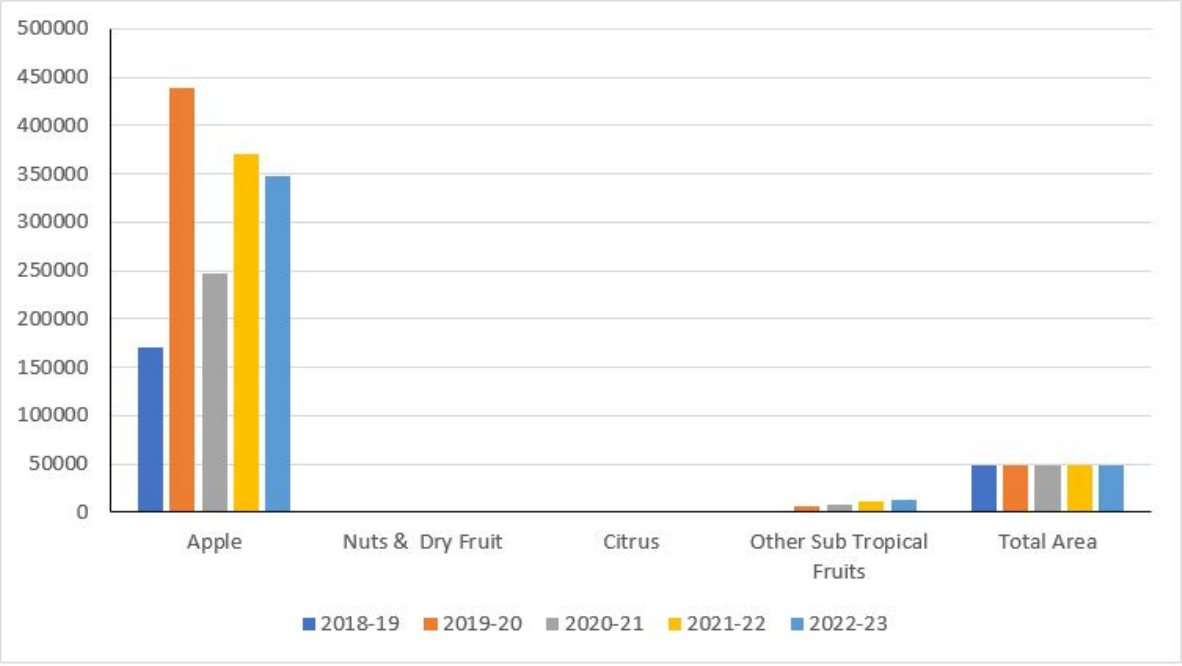
Horticulture plays an important role in the economic life and prosperity of the people of Shimla. During the last three decades, Shimla has made tremendous progress in the field of Horticulture. Greater emphasis is being laid on this sector because the geographical features and climatic conditions prevailing in the district are ideally suited for fruit farming. Among all

the fruits grown in Shimla, apples are the most widely grown and represent commercially the most important fruit crop. The cultivated apple area is 42291 hectares. The annual apple production usually lies between 300,000 to 400,000 metric tons. Apart from apples, the other varieties of fruits grown in Shimla are stone fruits as well as nuts, especially almonds.

Table showing area under Each Category of Fruits in District Shimla

Year	Apple	Nuts & Dry Fruit	Citrus	Other Sub Tropical Fruits	Total Area
2018-19	41104.5	1818.14	710.78	4639.85	**48273.2**
2019-20	41765.2	1778.14	686.22	4608.6	**48838.2**
2020-21	42159.2	1776.83	695.26	4676.16	**49307.4**
2021-22	42177.4	1776.83	737.04	4653.93	**49345.2**
2022-23	42291	1776.87	630.68	4684.44	**49383**

Source: Directorate of Horticulture, HP

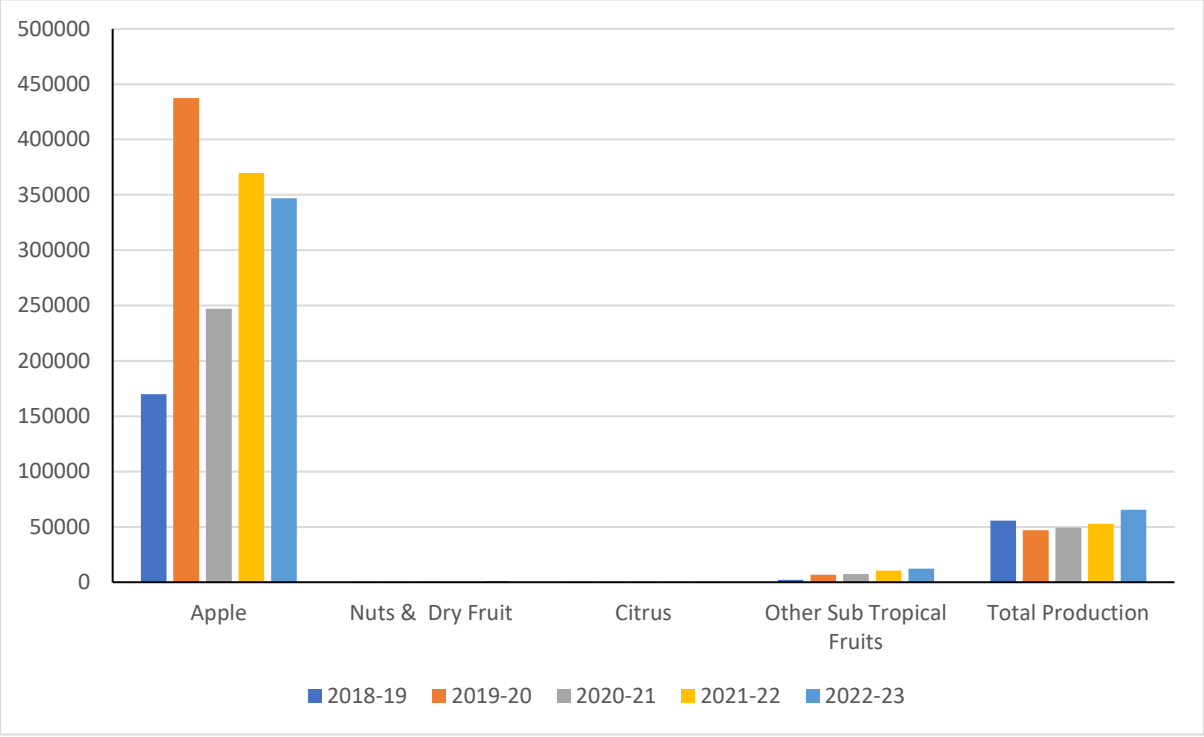


Graph showing Area under Each Category of Fruits in District Shimla

Table showing production (in M.T.)under Each Category of Fruits in District Shimla

Year	Apple	Nuts & Dry Fruit	Citrus	Other Sub Tropical Fruits	Total Production
2018-19	169962	144.11	21	2013.69	55719
2019-20	437552.59	453.07	31.91	6826.92	47066
2020-21	247177	693.87	45.89	7377.93	49389
2021-22	369720	365.54	48.89	10498.73	52861
2022-23	346993	871.43	53.91	12205.53	65439

Source: Directorate of Horticulture, HP



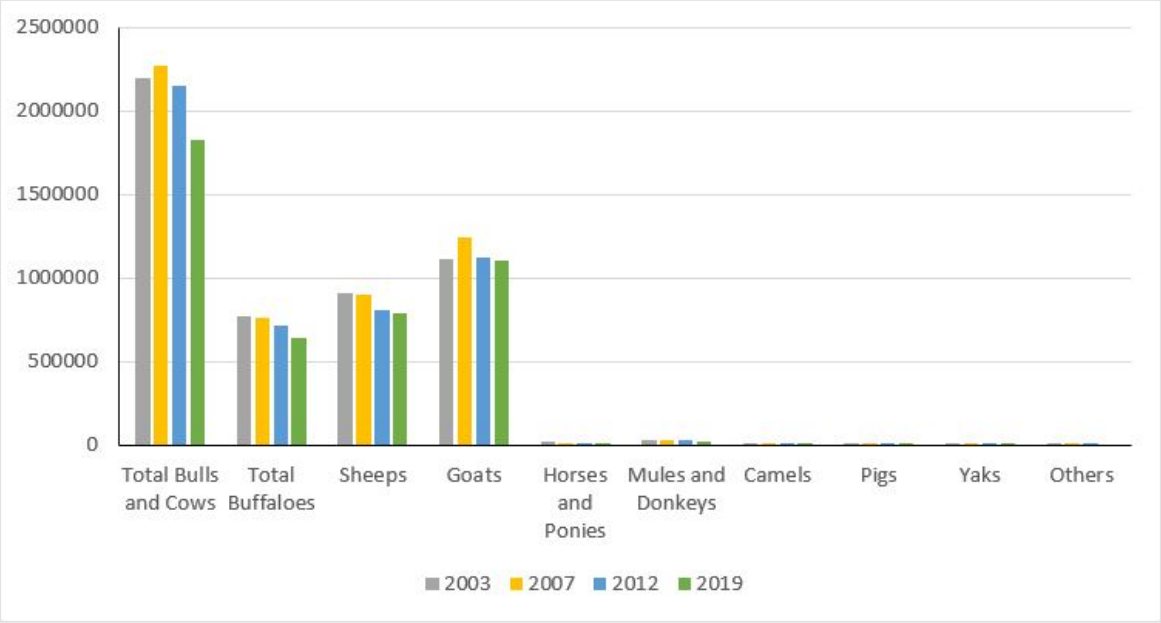
Graph showing Production under Each Category of Fruits in District Shimla

7.3 Animal Husbandry

Animal husbandry plays a very important role in the lives of farmers. They depend upon animals to sustain their day-to-day lives. Large numbers of farmers have adopted animal husbandry as a livelihood activity along with agriculture and horticulture. The animals reared by the farmers are mainly for milk, farm yard manure, and meat purposes. Most of the farmers rear animals for milk production which is mainly used for self-consumption. The livestock kept by the farmers includes cows (local and Jersey) buffaloes, goats and bullocks, etc. Most of the animals are indigenous (local breed) having very low milking capacity.

Table showing Livestock census of District Shimla

Years	Total Bulls and Cows	Total Buffaloes	Sheeps	Goats	Horses and Ponies	Mules and Donkeys	Camels	Pigs	Yaks	Others
2003	2196538	773229	906027	1115587	17144	32797	137	2795	1590	200
2007	2269178	761589	901299	1240836	13155	26361	56	2493	1705	14
2012	2149259	716016	804871	1119491	15081	30664	177	5033	2921	918
2019	1828017	646505	791345	1108413	8851	25212	26	2477	1940	0



Graph showing Livestock census of Shimla District

7.4 Fisheries

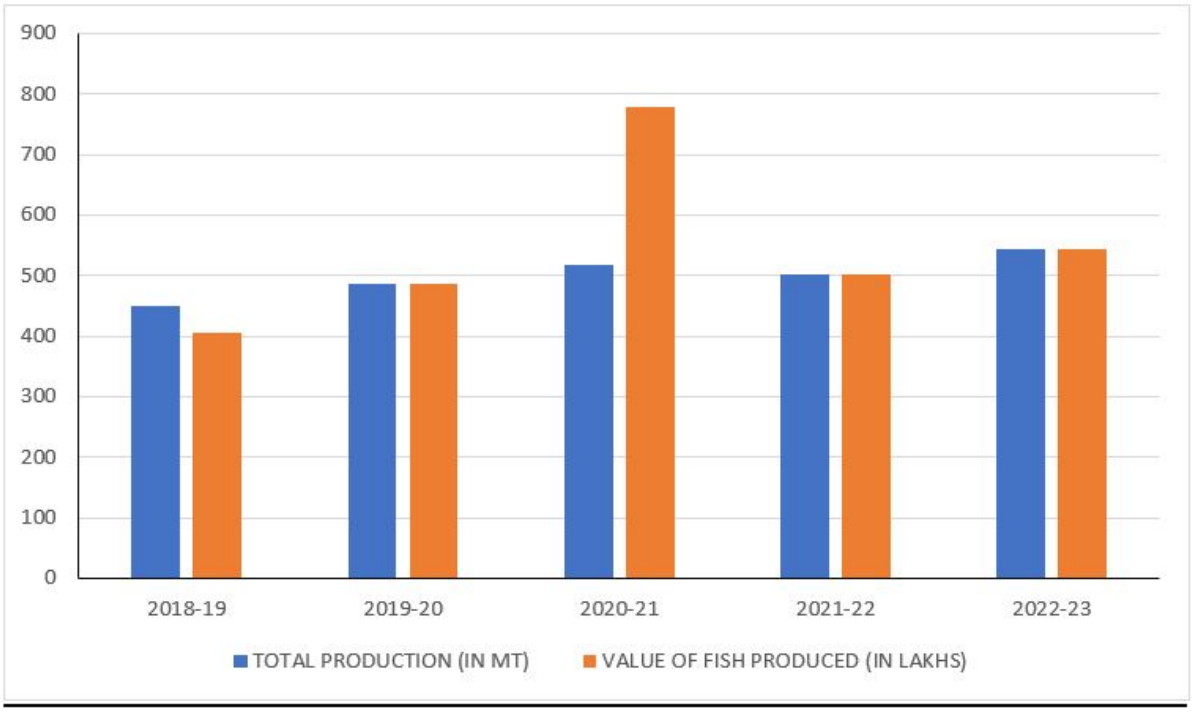
Reported Fish species in River Pabbar (district Shimla) is Salma gairdneriigairdnerii (Rainbow Trout), Salma truffafario (Brown Trout), Tor Pitutora (Mahaseer), Catlacatla, Labeorohita, Labeo batu, Labeodero, Labeodyochelus, Cirrhinamrigala, Notopteruschitala, Wallgoattu, Nemachilusbotio, Pontius ticto, Pontius sarana, Silver Carp, Mastacimballusarmatus.

Table showing Annual Production of Fisheries and Its Value of Catch in District Shimla

Table showing Annual Production of Fisheries at District Shimla		
YEAR WISE	**TOTAL PRODUCTION (IN MT)**	**VALUE OF FISH PRODUCED (IN LAKHS)**
2018-19	450	405
2019-20	485	485

2020-21	517.99	776.99
2021-22	502.66	502.66
2022-23	542.72	542.72

Source: Fisheries Department, HP



Graph showing Annual Production of Fisheries and Its Value of Catch in District Shimla

7.5 ***Forest***

Because of its complex geography and its great variations in altitude, Shimla is home to an enormous range of species, which span the subtropical to the alpine. The common trees in the Shimla hills belong to the conifer species (deodar, pine, spruce, fir). Several species of medicinal plants like Hath Panja (Dactylorhizahatageria) and Brahma Kamal (Saussureaobvallata) grow luxuriously in the valley. The valley is known for the presence of the majestic snow leopard, the Himalayan brown bear and the Himalayan Tahr. The Western Tragopan (the state bird of Himachal Pradesh) and the Monal pheasant are the prominent bird species found in the region.

Flora

Species/ Botanical Name	Common Name	Elevation Range (m)
Abies spectabilis (D.Don.) Mirbel	Himalayan high-altitude fir	3,000-4,000
Abies pindrowRoyle	Silver fir/ Tosh	2,500-3,200
Acer acuminatum Wall. ex D.Don.	Maple	2,500-3,200
Acer caesium Wall. ex Brandis	Maple	2,200-3,000
Aesculus indica Kk. f. & Th.	Horse chestnut/ Khnor	1,800-3,000
Alnus nepalensis D. Don.	Alder	1,500-2,000
Betula utilis D. Don.	Birch/ Bhojpatra	3,000-4,000
Buxus wallichianaBaillon	Boxwood/ Shamshad	2,500-3,000
Cedrus deodara G. Don.	Deodar/ Cedar	2,000-3,000
Cornus capitata Wall.	Dogwood	1,800-2,800
Corylus jacquemontiiDecne.	Hazelnut/ Bhutibadam	2,500-3,200
Cupressus torulosaD.Don.	Pencil cedar	1,800-3,000
Ilex dipyrena Wall.	Holly/ Kaluchha	2,000-2,800

Shrubs

Species	Altitude (m)
Aconitum heterophyllum Wall. ex Royle	3,300-4,200
Atropa acuminata Royle	1,500-3,000
Dactylorhizahatageria (D. Don.) Soo	2,800-4,000
Jurineamacrocephala (DC.) Benth.	3,000-4,300
Meconopsis aculeata Royle	3000-4,300
PicrorhizakurroaRoyle ex Benth.	3,200-4,200
SaussureagossipiphoraD.Don	3,800-4,500
Angelica glauca Edgew.	2,000-2,800
Arnebiabenthami (Wall. ex G. Don) I. M. Johnston	3,300-4,000
Arnebiaeuchroma (Royle) Johnston	3,500-4,400
Berberis aristata DC.	1,200-1,500
Betula utilis D.Don.	3,300-4,000
Dioscoreadeltoidea Wall.	2,000-3,000
Fritillaria roylei Hook.	2,800-4,000
Malaxismuscifera Lind.	2,000-3,000

Nardostachys grandiflora DC.	3,600-4,300
Paris polyphylla Smith	2,000-3,000
Podophyllum hexandrumRoyle	2,400-4,000
PolygonatumcirrhifoliumRoyle	1,500-3,000
Polygonatummultiflorum (L.) All	2,500-3,500
Polygonatumverticillatum (L.) All.	1,500-3,300
Saussureaobvallata (DC.) Edgew.	3,600-4,500
Taxus wallichianaZucc.	2,100-3,300
Zanthoxylum armatum DC.	1,200-1,800
Aconitum violaceum Jacq. ex Stapf	3,300-4,200
Ephedra gerardiana Wall. ex Stapf.	3,300-4,500
Hypericum perforatum L.	2,000-3,000
Juniperus communis L.	2,800-4,000
Rheum australe D. Don	3,000-4,200
Rheum webbianumRoyle	3,000-4,000
Roscoea alpine Royle	2,400-3,500
Roscoeaprocera Wall. ex Bak.	2,000-3,000
Selinumconnifolium	2,500-3,500
Selinumvaginatum Clarke	2,500-3,500
SkimmialaureolaSieb. &Zucc.	2,200-3,200
Symplocospaniculata (Thumb.) Miq.	1,500-2,500

Fauna

Common Name	Scientific Name
Asiatic Black Bear	*Ursus thibetanus*
Blue Sheep	*Pseudoisnayaur*
Common Leopard	*Panthera pardus*
Himalayan Brown Bear	*Ursus arctos*
Himalayan Ghoral	*Naemorhedus goral*
Himalayan Musk Deer	*Moschus chrysogaster*
Himalayan Tahr	*Hemitragusjemlahicus*
Red Fox	*Vulpes vulpes*
Serow	*Nemorhaedussumtraensis*

Common Name	Scientific Name
Snow Leopard	*Uncia uncia*

Birds

Little Forktail, Tirthan Valley

Crested Kingfisher, Tirthan Valley (2,700 m)

Blue Whistling Thrush, Sainj 2,000 m

Western Tragopan Male

Monal Male

Koklash Pheasant (Male)

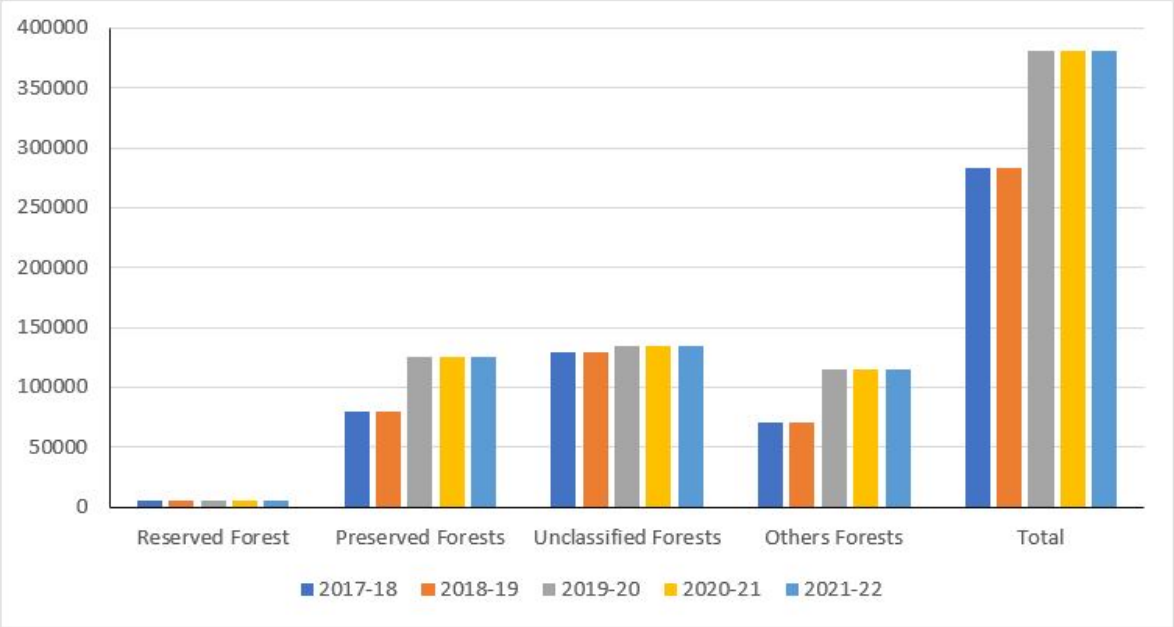
White-crested Kaleej

Insects

Blue Pansy, Junoniaoenone

The Paris Peacock, Papilioparis

Year	Reserved Forest	Preserved Forests	Unclassified Forests	Others Forests	Total
2017-18	4820.11	79100.07	128849.09	70893.89	283664.00
2018-19	4820.11	79100.07	128849.09	70893.89	283664.00
2019-20	5390.73	124858.98	135020.67	115410.02	380680.40
2020-21	5390.73	124858.98	135020.67	115410.02	380680.40
2021-22	5390.73	124858.91	135020.67	115410.34	380680.65



Graph Showing Distribution of Forests in District Shimla

8 Surface Water And Ground Water Scenario Of The District

8.1 Surface Water

About 65% of the district is constituted of Tons Watershed, Shalvi Watersed, Pabar Watershed and Giri Watershed these jointly form Yamuna Catchment. River Yamuna, a main tributary of Ganges River. This river is perennial in nature and it originates from Yamunotri Glacier near Baderpoonch peaks (38° 29' N, 78° 27' E) at an elevation of about 6387 meters above mean sea level (MSL) in district Uttrakashi of State of Uttrakhand. The remaining 35 % is drained by the Satluj River. Satluj or Sutlej river rises from beyond Indian borders on the Southern slopes of the Kailash mountain near Mansarover lake from Rakas lake, as Longcchen Khabab river (in Tibet). It is the largest among the five rivers of Himachal Pradesh.

S.No.	Basin	Area (Sq. Km)	Percentage Area
1	**Tons Watershed**	354.1	6.90
2	**Shalvi Watershed**	745.73	14.53
3	**Satluj Watershed**	1825.5	35.58
4	**Pabbar Watershed**	1260.48	24.57
5	**Giri Watershed**	945.3	18.42
Total		**5131.11**	**100**

The drainage pattern is mostly dendritic to sub-dendritic i.e. the tributaries meet at low angles and branch at random, like a tree pattern. A dendritic drainage pattern indicates comparatively low permeable rocks which allow high drainage density in the district.

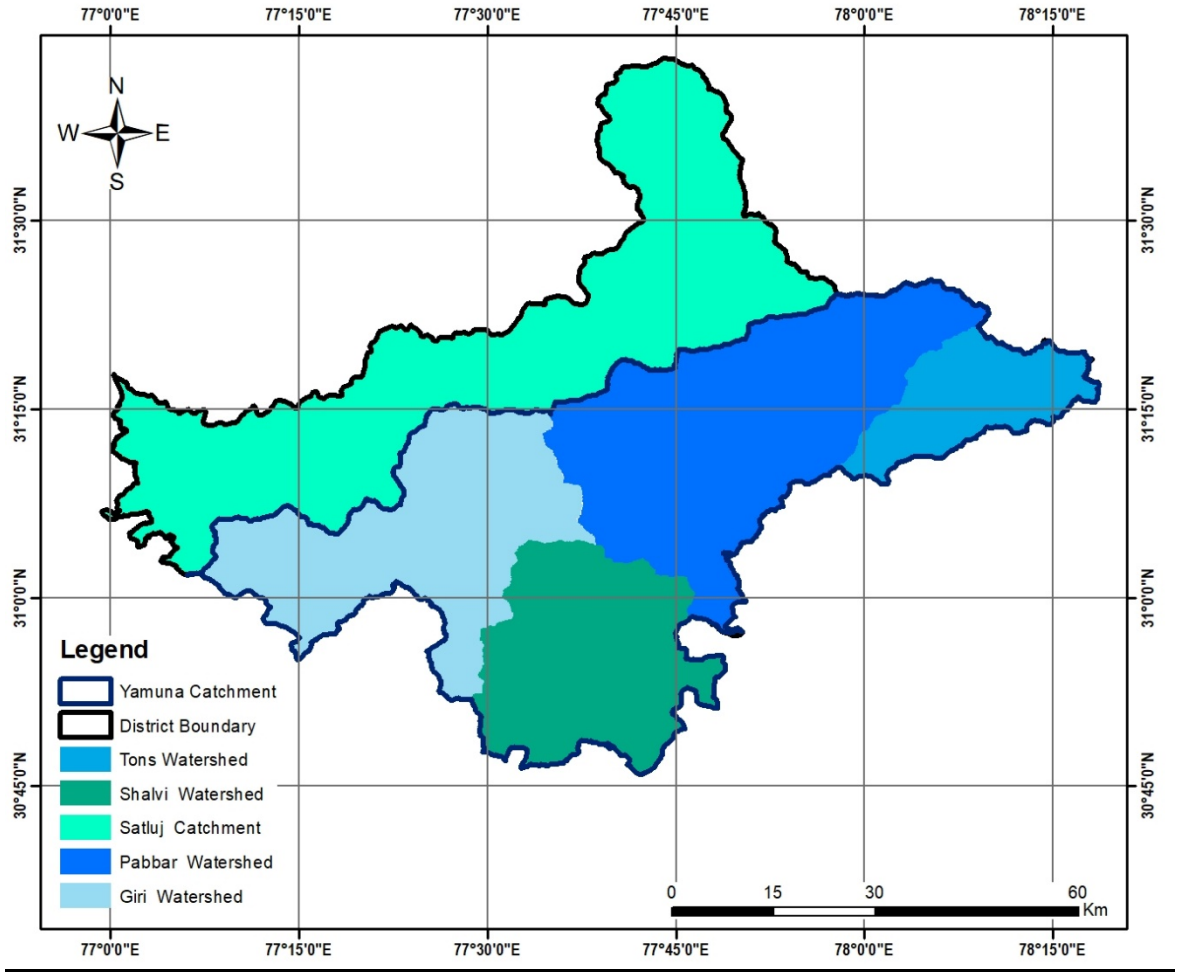


Fig showing Watershed Map of Shimla District

8.2 Groundwater

The district being hilly & mountainous, traditional sources of ground water mainly springs have played a major role in past in providing assured irrigation and water supply. These include the nallas, springs, Chasmas, khatis. In some of the areas, at present too, these are the only sources of water for the settlements. However, modern means for tapping the groundwater have been employed in recent years.

Hydrogeological, the district is divided into two distinct and well-defined units viz. porous formations constituted by unconsolidated sediments and the fissured formations or hard rock formations constituted mainly by semi-consolidated to consolidated rock.

The fissured formations include the semi-consolidated to consolidated (hard) rocks exposed in the district and are of sedimentary, metamorphic and igneous origin. These form low and high hill ranges throughout the district. Fractured and jointed sandstone, and siltstone forms low-potential aquifers in the area. In general weathered and fractured hard rocks are favorable for groundwater aquifers. Fracture zones and contact zones form the important aquifers in the topographic low areas, with poor to moderate yields. These fracture or fault zones form potential groundwater zones. Groundwater in these hilly areas oozes in the form of

seepages, and springs and is utilized for domestic and other uses. At places, shallow boreholes fitted with hand pumps have been constructed to develop groundwater.

The unconsolidated sediments comprising fluvial, channel deposits, valley fills and terrace deposits and alluvial fans constitute the porous aquifers in the district. These sediments consist of sand, gravel, cobbles, pebbles and boulders interlayered with clay beds. These sediments form prolific aquifers.

Rainfall is the major source of groundwater recharge, apart from the influent seepage from the rivers, irrigated fields and inflow from upland areas, whereas discharge from groundwater mainly takes place through wells and tube wells; effluent seepages of groundwater in the form of springs and base flow in streams etc.

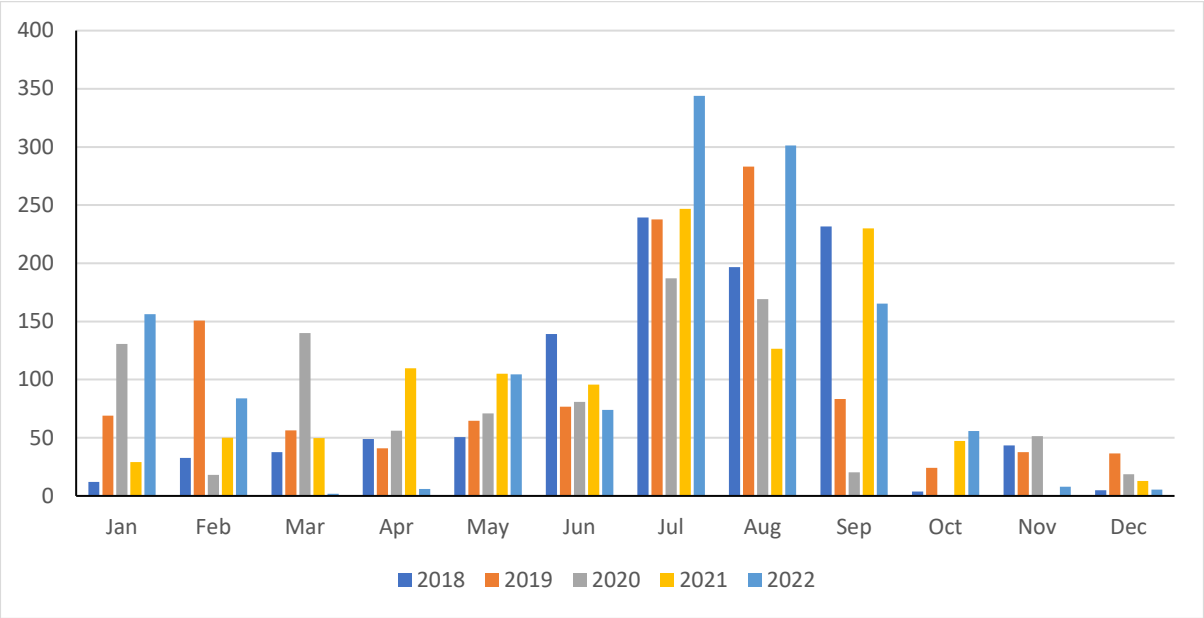
9 Rainfall Of The District And Climatic Condition

Rainfall varies significantly with the altitude of the area. The catchment area receives rainfall due to western disturbances that pass over the northwestern part of the country during the winter months. Significant precipitation in the form of snow is received at higher altitudes and rainfall in valleys is received during the winter month. The rainy season generally starts in mid-July and extends up to mid-September. During winter the rains are scarce and extend from 15th December to 15th February. The following Table shows the quantum of rainfall from the year 2018 to 2022 in the district as per IMD.

Table Showing Rainfall Data In Millimetres Of District Shimla

SHIMLA DISTRICT RAINFALL IN MILLIMETERS (R/F)												
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	RAINFALL (in mm)											
2018	12	32.7	37.6	48.8	50.5	139.3	239.3	196.7	231.7	3.8	43.4	4.8
2019	69	150.6	56.2	40.9	64.6	76.7	237.6	283.1	83.4	24.1	37.5	36.5
2020	130.6	18	140.1	56.1	70.9	80.8	187.1	169.1	20.4	0	51.5	18.7
2021	29	50.1	49.7	109.7	105	95.8	246.7	126.6	230.1	47.2	0.7	12.9
2022	156.3	83.9	1.8	5.9	104.4	73.9	344	301.2	165.3	55.9	7.8	5.5

Source: Meteorological Department, Govt. of India



Graph Showing Annual Rainfall Data Of District Shimla From The Year 2018 To 2022

10 Details Of The Mining Leases In The District

Sr. No.	Name and Address of Mining Lease Holder	Khasra No./Location in Mauza/Mohal	Area (Hectares/Bighas	Lease Period	Coordinates	
1.	Pramod Kumar S/o Mansa Ram, Vill. Naggar, Teh. Sunni, Distt. Shimla	688, 689, 690, 691 & 693/2 &693/3(Naggar/ Sunni)	(0-68-93 Hect.)	04.11.2020 to 03.11.2025	31°13'34" N	77°03'36" E
2.	Pramod Kumar S/o Mansa Ram, Vill. Naggar, Teh. Sunni, Distt. Shimla	11/5/2 & 12/5(Than / Sunni)	(00-98-21 Hect.)	24.11.2021 to 23.11.2031	31°14'2" N	77°03'36" E
3.	Vipin Sharma, V.P.O. Chaba, Teh. Sunni, Distt. Shimla	1244, 1246, 1247, 1248, 1249 & 1250/(Dargi/Sunni)	(1-62-35 Hect.)	01.05.2015 to 30.04.2030	31°13'47.57" N	77°02'59.01" E
4.	M/s Suman enterprises Suman Cottage Sanjauli, Teh.	467/2/(Sargatta/Junga)	(1-72-58 Hect)	17.09.2021 to 16.09.2031	31°00'17.9" N	77°15'36.00" E

	& Distt. Shimla HP					
5.	Vinod Shandil Kawalag Majhar	654/2, 655, 664, 666, 667, 668/2 & 672/2(Kawalag Mazhar/Shimla)	(01-35-36 hect))	08.04.2022 to 08.04.2037	31°02'31.68" N	77°11'21.61" E
6.	M/s Sharma Stone Crusher, Prop. Manish Mohan Sharma VPO Salana, Tehsil & Distt. Shimla.	1042, 998, 1029 & 1041/(Salana/Shimla)	(1.0166 hect))	28.07.2015 to 27.07.2030	31°02'41.4" N	77°05'44" E
7.	Ashok Thakur S/o Narayan Singh R/o Village Thund(Panjoli) P.O. Satlai Sub-Tehsil Junga Shimla (H.P.)	514/1(Thund (Panjholi)/ Junga)	(01-36-55 Hect.)	24.11.2015 to 23.11.2030	30°59'54.64" N	77°16'12.63" E
8.	Satya Prakash R/o Vill Mandar PO Baldeyan Tehsil and Distt Shimla H. P.	190/(Mandar/Shimla)	(0-90-83 Hect.)	15.08.2016 to 14.08.2026	31°11'53.38" N	77°11'43.39" E
9.	Manish Mahendra Village Panahel Tehsil Sunni, District Shimla HP	777/447 & 778/447(Panehal/Sunni)	(0-44-83 Hect.)	24.07.2019 to 23.07.2024	31°11'37.33" N	77°10'1.58" E
10.	Ishwar Rohal, S/o Ram Krishan Rohal, Village Garo, P.O. Shoghi, Tehsil & Distt. Shimla H.P.	4/10/2 (Tikkari/Shimla)	(0-57-98 Hect.)	10.07.2020 to 09.07.2030	31°10'12.079 " N	77°06'22.08" E
11.	Smt. Kamla Devi W/o Lt. Sansar Chand Sahani, R/o Kamla Niwas, Near Dhalli	6/3 (Than/Sunni)	(0-58-32 Hect.)	20.02.2020 to 19.02.2025	S31°14'2" N	77°3'58" E

	Tunnel, Shimla HP					
12.	Smt. Shakuntla Devi W/o Hira Singh, village Dido, P.O. Dev Nagar, Tehsil & Distt. Shimla HP	621/2 & 622/2 (Tikkari/Shimla)	(0-30-76 Hect.)	27.07.2021 to 27.07.2026	31°09'44.95" N	77°07'1.15" E
13.	Smt. Kavita Thakur, R/o Vill. Kanog, P.O. Bhararia, Tehsil & Distt. Shimla HP	423/2 & 425/1 (Tikkari/Shimla)	(00-52-68 Hect.)	05.04.2023 to 04.04.2028	31°2'26.50" N 31°2'27.18" N 31°2'28.57" N 31°2'27.59" N 31°2'26.18" N 31°2'25.71" N	77°16'48.98" E 77°16'49.87" E 77°16'52.22" E 77°16'53.94" E 77°16'51.65" E 77°16'51.12" E
14.	Diwakar Dutt Sharma, S/o Bija Ram, R/o Vill. & P.O. Devnagar (Moolbari), Tehsil & Distt. Shimla HP	416 (Moolbari /Shimla)	(01-12-81 Hect.)	06.09.2023 to 05.09.2028	31°9'30.51" N 31°9'31.46" N 31°9'31.79" N 31°9'30.90" N 31°9'30.50" N 31°9'29.31" N 31°9'30.90" N 31°9'29.86" N	77°6'18.97" E 77°6'18.83" E 77°6'23.48" E 77°6'23.945" E 77°6'23.98" E 77°6'24.01" E 77°6'22.30" E 77°6'20.04" E
15.	M/s Shri Ram Stone Crusher, (Partners S/Shri Saurah Bassi, Bir Singh, Mohamad Rafi & Smt. Veena Devi), Vill. Nadukhar, P.O. Basantpur, Tehsil Sunni, Distt. Shimla HP	515/2, 517 & 935 (Nadukhar/Sunni Shimla)	(00-80-12 Hect.)	09.08.2023 to 08.08.2033	31°12'46.80" N 31°12'45.60" N 31°12'44.30" N 31°12'42.81" N 31°12'41.49" N	77°09'16.30" E 77°09'19.22" E 77°09'20.54" E 77°09'22.23" E 77°09'16.55" E

16.	M/s JDD Kalta Bros. and Associates	621/2 & 622/2 (Tikkari/Shimla)	(0-30-76 Hect.)	28.05.2009 to 27.05.2024	31°11'10.84" N	77°28'49.82" E
17.	Narender Kumar Justa, Vill. Chamera, P.O. Rawla Kair Teh. Kotkhai	423/2 & 425/1 (Tikkari/Shimla)	(00-52-68 Hect.)	26.10.2023 to 25.10.2028	31°09'30.76" N	77°30'22.44" E
18.	Dixit Kaparate, VPO Purag Teh.Kotkhai, Distt. Shimla	416 (Moolbari /Shimla)	(01-12-81 Hect.)	21.06.2023 to 20.06.2033	31°06'12.88" N	77°25'50.08" E
19.	Yogesh Kumar Sood VPO Mohri, Teh. Theog	515/2, 517 & 935 (Nadukhar/Sunni Shimla)	(00-80-12 Hect.)	02.08.2023 to 01.08.2038	31° 09'13.81" N	77°25'12.07" E
20.	Yogesh Kumar Sood VPO Mohri, Teh. Theog	621/2 & 622/2 (Tikkari/Shimla)	(0-30-76 Hect.)	21.03.2023 to 20.03.2028	31° 08'21.78" N	77°24'44.42" E
21.	Sandeep Thakur S/o Kewal Ram, Vill. Talli, P.O. Chanair, Teh. Theog, Shimla	335/2/(Tikkar/Theog)	(0-59-61 Hect.)	21.05.2015 to 20.05.2025	31°04'1.87" N	77°25'30.48" E
22.	Bharat Bhushan Verma VPO Sainj Teh. Theog Distt Shimla H.P	66, 69, 70, 71 & 72/(Tihana/Theog)	(01-43-24 Hect.)	07.07.2023 to 06.07.2033	31°03'36.48" N	77°25'10.84" E
23.	Bhinder Singh Verma Prop. M/s Verma Stone Crusher Village Gajeri P.O. Jais, Tehisl Theog Distt. Shimla	388/363 & 365	(00-79-69 Hect.)	30.04.2016 to 29.04.2026	31°06'23.86" N	77°23'25.90" E
24.	Suresh Chauhan S/o Lt. Jai Ram, Village Kathori, P.O. Deha, Tehsil Chopal, Distt. Shimla HP	48 & 35/(Pundar/Theog)	(01-11-24 Hect.)	09.08.2023 to 08.08.2033	31°02'0.56" N	77°25'17.77" E
25.	Keshav Ram Village Kanufari, PO	337/1 & 336/(Dhar	(00-57-32 Hect.)	06.01.2017 to	31°01'33.36" N	77°19'21.90" E

	Dharech, Tehsil Theog Distt. Shimla HP	ech/Theog)		05.01.2027		
26.	Vikram Kanwar, Vill. Khaltunala, PO Rawlakiar Tehsil Kotkhai Shimla	364/2/(Kolvi/Kotkhai)	(01-15-67 Hect.)	17.03.2018 to 16.03.2033	31°10'8.11" N	77°30'20.20" E
27.	Devraj Verma R/o Balson House Khalini Tehsil and Distt Shimla H.P	698/2 and 704/2(Balghar Katyana-II)	(01-12-14 Hect.)	15.02.2023 to 14.02.2028	31°03'49.1"N	77°25'37.0"E
28.	Jagdish Chand Verma, S/o Late Ratti Ram, Vill. Tihana, Sub-Tehsil Deha Distt. Shimla HP	220 (Tihana/Theog)	(01-12-87 Hect.)	27.07.2023 to 26.07.2033	31°03’37.1” N 31°03’36.4” N 31°03’37.5” N 31°03’39.4” N 31°03’35.37” N 31°03’36.00” N	77°26'42.9"E 77°26'41.6"E 77°26'43.1"E 77°26'39.2"E 77°26'38.33" E 77°26'41.6"E
29.	Rajinder Verma S/o Matha Ram, R/o Vill. & P.O. Sarion, Tehsil Theog Distt. Shimla HP	313/3 (Jhakri/Theog)	(00-35-70 Hect.)	23.12.2023 to 22.12.2028	31°7’52.03” N 31°7’53.73” N 31°7’54.00” N 31°7’54.72” N 31°7’52.58” N	77°23’14.04” E 77°23’12.60” E 77°23’13.13” E 77°23’14.40” E 77°23’15.23” E
30.	Ajay Rathore S/o Ishwar Singh Rathore, Vill. Kiri, P.O. & Tehsil Nerwa, Distt. Shimla HP	522/2 (Chhachar/Nerwa Chopal)	(0-67-80 Hect.)	06.01.2018 to 05.01.2028	30°58'13.01' N	77°40'55.06" E
31.	Uday Singh Kanwar S/o Birender Singh, Village Makrandli PO Kedi Tehsil Chopal Distt. Shimla HP	88/(Mukhraldi/Chopal)	(1-64-24 Hect.)	04.11.2020 to 03.11.2030	30°53'06.21" N	77°40'30.63" E

32.	M/s O.P. Mehta V.P.O. Khaneri, Teh. Rampur, Distt. Shimla	493/480/33, 109/15, 115/110/15, 117/113/21 & 111/21 /(Pashada/ Rampur)	(1-10-78 Hect)	4.02.2012 to 3.02.2027	31°28'25.37" N	77°40'56.31" E
33.	M/s O.P. Mehta V.P.O. Khaneri, Teh. Rampur, Distt. Shimla	493/480/33, 109/15, 115/110/15, 117/113/21 & 111/21 /(Pashada/ Rampur)	(1-10-78 Hect)	17.06.2015 to 16.06.2030	31°28'25.37" N	77°40'56.31" E
34.	Subhash Chand Vij, Vill. Daro, P.O. Narkanda, Teh. Kumarsain, Distt. Shimla H. P.	64/2 & 65/2/(Dharo/Kumarsain)	(0-45-90 Hect.)	13.05.2015 to 12.05.2025 (10 years)	31°14'50.04" N	77°29'2.09" E
35.	Sachin Sood, M/s Himalyan Stone Crusher, Prop. Rampur Bsr.	215/1(Jubya Sanathli/Rampur)	(0-93-00 Hect.)	01.07.2015 to 30.06.2030 (15 years)	31°26'35.17" N	77°39'22.028" E
36.	Kanwar Singh Jistu S/o Lal Chand, Vill. Thana-Jubbar, P.O. Fagu, Teh. Theog, Distt. Shimla 94180-71558 98167-62403	527, 528, 549, 550 & 551(Badogi/Kumarsain)	(00-92-50 Hect.)	12.03.2009 to 11.03.2024	31°20'05" N	77°20'15" E
37.	Yashwinder Singh Vill. Nirsu, P.O. Duttnagar Tehsil Rampur	5(5/1, 5/2), 7, 8, 9, 10, 13 & 14(Charutha/Kumarsain)	(1-97-67 Hect.)	07.06.2016 to 06.06.2026	31°22'44.61" N	77°32'54.42" E
38.	Yashwinder Singh Vill. Nirsu, P.O. Duttnagar Tehsil Rampur	1838, 1839, 1840 & 1841 (Nirath/Rampur)	(01-53-62 Hect.)	17.08.2016 to 16.08.2026	31°22'1.3" N	77°32'43.2" E

39.	Rajender Kumar Kashmir House Rampur Bsr. Distt. Shimla	1995/1/1(Jhakri/Rampur)	(0-98-70 Hect.)	12.10.2017 to 11.10.2032	31°29'2.91" N	77°41'23.67" E
40.	M/s M.G. Mehta & Associates Village Sainj, PO Kirti, Tehsil Kumarsain Distt. Shimla HP	31, 32, 280/33/2, 34, 36, 37, 38, 282/39 & 284/42(Chamod/Kumarsain)	(04-64-99 Hect.)	09.03.2018 to 08.03.2028	31°20'6.28" N	77°20'44.33" E
41.	Sanjeev Mehta S/o Sardari Lal Mehta Prop. M/s Satya Surya Shiv Stone Crusher Stone Crusher Vill. Suild PO Thanadhar Tehsil Rampur Distt. Shimla	494/480/33/3 & 477/33/3(Pashada/Rampur)	(0-82-02 Hect.)	16.03.2018 15.03.2028	31°28'7.90" N	77°40'40.4" E
42.	Smt. Veena Thakur W/o Gulab Singh Thakur Village Nirsu P.O. Duttnagar Tehsil Rampur	176/2(Jhunjan/Kumarsain)	(0-49-11 Hect.)	23.04.2018 to 22.04.2028	31°17'14" N	77°19'32.32" E
43.	Suresh Kumar, Village Chafa, P.O. Bharari Tehsil Kumarsain Shimla	130/2 and 124	(0-24-68 Hect.)	31.07.2021 to 30.07.2026	31°21'11.9" N	77°24'29.5" E
44.	Dalip Singh S/o Taradutt R.o Vill Mayog P.O Kamlanagar Tehsil and Distt Shimla H.P	34, 2307/38 (Duttnagar/Rampur)	(00-48-62 Hect.)	12.12.2022to 21.12.2027	31°23'40.6"N	77°34'36.2"E
45.	Amit Dogra R/o Vill Mahavali Tehsil Kumarsain Distt Shimla H.P	69	(0-24-11 Hect.)	14.12.2022 to 13.12.2027	31°21'32.1"N	77°22'55.7"E
46.	Sunder Lal, R/o Vill. Parashan, P.O. Luhri, Tehsil	250/2 (Parashan/Kumarsain)	(00-67-63 Hect.)	13.03.2024 to 12.03.2029	31°21’5.65” N 31°21’5.43” N	77°24’33.08” E 77°24’32.98” E

	Kumarsain, Distt. Shimla H.P.				31°21’4.94” N 31°21’3.85” N 31°21’3.34” N 31°21’2.28” N 31°21’1.72” N 31°21’1.28” N 31°21’2.17” N	77°24’31.75” E 77°24’32.38” E 77°24’30.75” E 77°24’31.97” E 77°24’32.06” E 77°24’33.13” E 77°24’33.04” E
47.	Ajay Sauhta, S/o Vijay Singh Sauhta VPO Dhar, Teh. Jubbal, Distt. Shimla	172/1(Mungra Nadhal/Jubbal)	(0-84-72 Hect.)	04.06.2015 to 03.06.2030	31°03'31.94" N	77°41'21.29" E
48.	Virender Banshtu Vill. Dalgoan, P.O. Kutara, Teh. Rohru, Distt. Shimla	1694/2/1/2(Rantari/Rohru)	(0-71-20 Hect.)	16.02.2009 to 15.02.2024	31°12'54.65" N	77°46'48.38" E
49.	Jai Chauhan PO Hatkoti Tehsil Jubbal Distt. Shimla HP	1104/1(Karasa/Rohru)	(0-67-28 Hect.)	22.12.2017 to 21.12.2032	31°09'29.97" N	77°44'8.61"E
50.	Surinder Dutta, Dutta Complex, Main Bus Stand, Rohru Distt. Shimla HP	280/2(Kuttu/Rohru)	(01-63-72 Hect.)	07.08.2019 to 06.08.2029	31°13'29.2"N	77°45'28.35" E
51.	The Additional General Manager (Geotechnical/ QC), M/s Satluj Jal Vidyut Nigam Ltd., Luhri Hydro Electric Project, Shakti Sadan, Corporate Office, SJVNL Complex, Shanan, Distt. Shimla HP	360/1 & 536/363/1 (Khaira/Sunni)	(10-15-29 Hect.)	22.02.2024 to 21.02.2029	31°14’55.6” N 31°14’54.9” N 31°14’49.8” N 31°14’44.6” N 31°14’46.8” N 31°14’48.1” N	77°12’47.0” E 77°12’49.0” E 77°12’54.1” E 77°12’55.6” E 77°12’37.6” E 77°12’35.6” E

11 Details Of Royalty Or Revenue Received In Last Four Years

Sr. No.	Financial Year	Revenue collected Offline (In Rs)	Revenue Collected Online (In Rs)	Total Revenue Collected (In Rs)
1	2020-21	59303956	10417020	69720976/-
2	2021-22	5842000	25481580	31323580/-
3	2022-23	26396206	47766900	74163106/-
4	2023-24	20892558	80747788	101640346/-

12 Details Of Production Of Minor Mineral In Last Four Years

Table 12: Production of Minor Mineral in Metric Tonnes

FY	2020-21	2021-22	2022-23	2023-24
Sand	153823	18069	2600	15760
Stone	341869	107855	101252	689930
Bajri	499747	322649	221040	305558

13 Mineral Map Of The District:

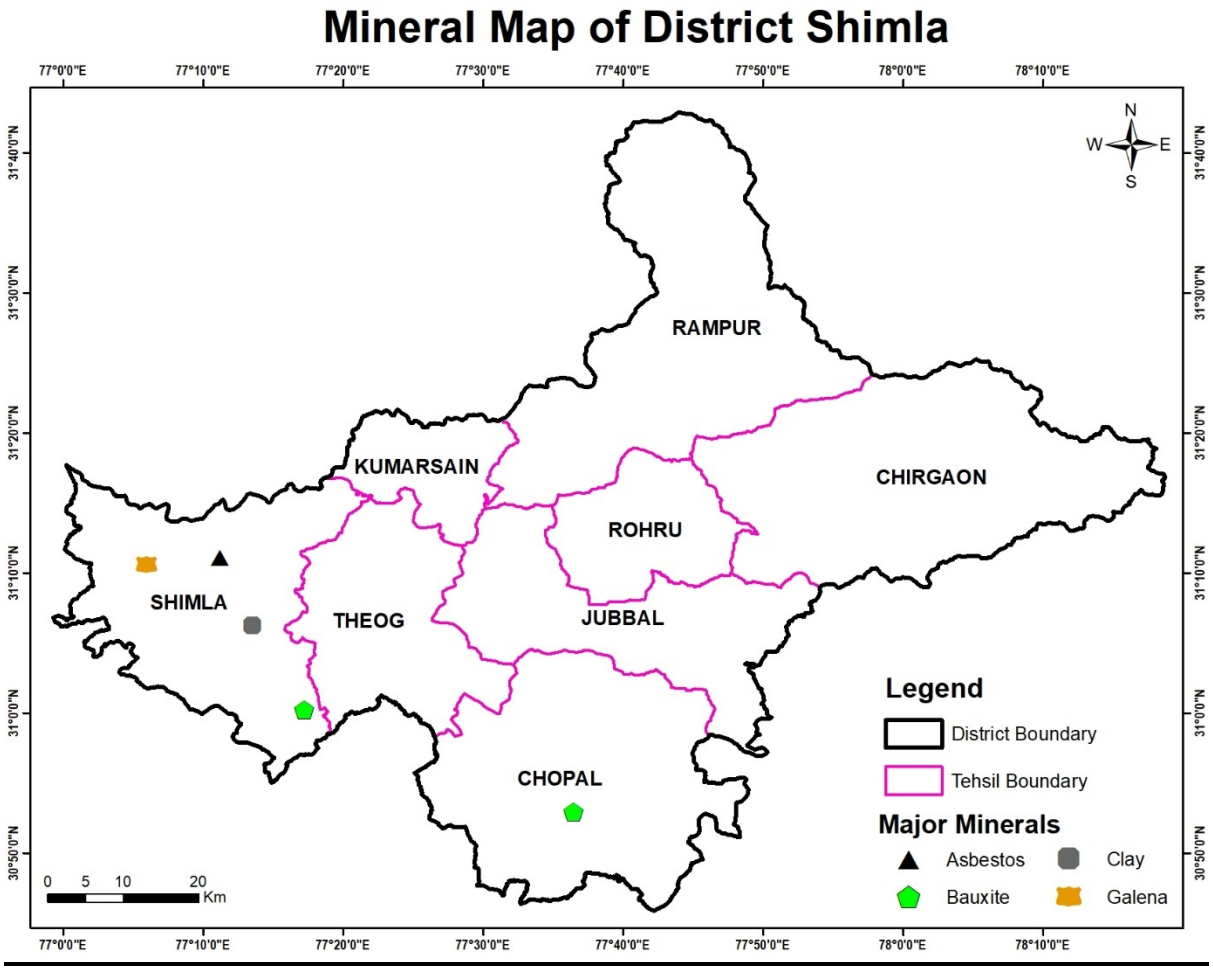


Image showing Mineral map of District Shimla

Asbestos

Chrysotile asbestos was observed by Captain Palmer in association with a dolerite dyke on the Shali ridge north of Shimla.

Bauxite

(i) Occurrence of bauxite has been reported about one kilometre northeast of village Deharu (30° 49' : 77° 39'). The bauxite forms basal part of the Subathu Formation (Eocene). It occurs at a number of places as localized pockets which range in thickness from one to three metres but generally do not extend laterally beyond 10 metres. The bauxite is earthy pale-grey and brownish in colour and is characterised by well developed pisolitic texture. Sample of bauxite on chemical analysis indicated the presence of Al203 55.10% Si02 24.97%, Fe2O3 1.20% TiO2 5%.

(ii) (ii) In Chapla area (31° 03' : 77° 11'), the bauxite deposit occurs mostly as lateritised rocks at the base of the Palaeocene Kakra rocks. Thickness and length of the zones vary from one to five metres and one to five kilometres respectively. The deposit is low in alumina and high in silica content.

Clays

Clay occurrences in Himachal Pradesh can be broadly classified into (i) lacustrine and fluvial, (ii) residual associated with granite and (iii) associated with the Middle and Upper Siwaliks.

Pottery clays resulting from the decomposition of limestone associated with carbonaceous slates are described as occurring on the spurs of the hills running north from Shimla (31º08'; 77º10'). They have been used for themanufacture of bricks, tiles and coarse pottery.

Galena

Lead Ore in the form of vein occurs in schist and gneiss of JutoghGroup at Darkoti (31° 07' : 77° 36'). At Darkoti the lead mineralization occurs in garnetiferous mice schist, granitic gneiss and quartz- mica schist. Two old workings exists in the area , first the Basag - ka- Nala old mine which is situated one kilometer west of Darkoti village in garnetiferous mica schist trending N 30ºW-S30ºE and dipping 25º NE the second old working is on the right side of nala. The mineralization consist of a vein of massive galena 2.5 cm to 3 cm thick and is associated with quartz vein. The vein occurs along a joint plane which trends N 25º E – S25ºW and dips 75º to SE. The mineralized vein is one metre in length and does not extend in strike. Lead values vary form 0.73% to 12.0% at different localities.

Mineral water

Ten springs occur on the right bank of the Satluj river near Tattapani (31° 14: 77° 50'). The temperature of the water is 57°0. The water is strongly sulphurous with a disagreeable saline taste. It contains chloride and sulphate of soda.

14 Total Mineral Reserve Available In District: -

Mainly three types of Minor mineral constituents like Sand, Stone and Bajri are required for any type of construction apart from other materials like cement and steel.

In earlier times, mud houses/buildings were constructed with the use of mud. However, with the passage of time, new techniques of development activities were started. As such the demand of Minor minerals started on an increasing trend. In order to meet the requirement of raw material for construction, the local residents used to lift sand etc. from the river beds to meet out their bonafide requirement. However, after coming into being "The Himachal Pradesh Minor Mineral Rules 2015", the mining is regulated in accordance with the rules. From the geological report, it appears that there are deposits of various minerals. The important minerals that are available in this district in a commercial scale are River borne Sand, Stone, Hill slope Stone mines (Leases), Slate etc.

At present, based on existing running mining leases of stone/slate (Hill slope) and available Mining plans (51 registered mining leases) mining operations is being carried out to produce stone/slate mining in the district. However, there is potential of stone and slte deposits have been identified in the District.

15 Quality /Grade Of Mineral Available In The District: -

The rock formations occupying the district range from the pre-Cambrian to the Quaternary period. Hard formations, form hilly and mountainous terrain and mainly comprise of igneous and metamorphic rocks, belonging to the Jutogh, Shali/ Largi and Shimla groups and occupy the major parts of the area in the northern, central and eastern parts. Granites and gneisses are intruded in the meta-sediments of the Shali/Largi and Shimla groups. In the western and southern parts sediments comprising of sandstone, shale, siltstone, conglomerate etc of the Dharamshala/Sabathu group and Siwalik group of Tertiary age are observed. Alluvium, terrace deposits, and fluvial deposits of the Quaternary period occur in the intermontane valleys, viz., Balh Valley, Sarkaghat Valley etc., and constitute an important unit from a groundwater point of view.

The construction grade aggregate materials of good quality of Minor minerals are present in the District. The slate and building materials are also important minerals of the District. As we have assessed Mineral availability of the district is fair and acceptable quality and it has commercial value. The Quartzitic rock and granitic gneiss, granite etc. are extensively quarried for the manufacturing of grit and are used in road metal, fencing blocks, building constructions etc. Granite & Granite Gneiss rocks are normally composed of mainly feldspar, quartz, mild amphibole, pyroxene, olivine, biotite etc. all these physical properties signify its good cementing properties and higher resistance which indicate its suitability for construction stone as the source areas have numerous fractures & joints.

16 Use Of Mineral

A lot of construction activity in the private & Government sectors is going on. Stone, Bajri(Grit) and Sand are the basic requirements for construction materials and there is a necessity for such activity to flourish so that the requirement of the material can be met locally. Stone Aggregates represent about 80% to 98% of quarry output, most of which is used in road construction, maintenance and repair. Stones are derived from rocks, which form the earth's crust and have no definite shape or chemical combination but are mixtures of two or more minerals. They are strong, durable and decent in appearance. Much of this goes to the production of road metal, to provide a sturdy base for roads. Stone is an essential and more permanent building material in construction than other natural building materials. Based on the

type, Stones can be used in buildings for flooring, roofing, masonry paving roads and also as aggregates for concrete.

Only the harder more resilient rocks can be employed for most road surfacing requirements. Apart from road usage, substantial amounts are mixed (coarse gravel-sized stone with finer stone particles or sand) with cement and water to make concrete.

17 Demand And Supply Of The Mineral In The Last Three Years:

There is a huge demand for Stone Grit and M-Sand for the domestic and infrastructure sectors. Only a few Stone mines have environmental clearance for the extraction of Stone. There is a limited supply of Stone and there is a huge gap. There are no statistical data, regarding the demand and supply of minerals in the district. Due to the construction of National Highways, Tunnels, Hydro projects and public buildings for development works in the district, a large number of Stone chips & boulders are required. This will be met only by granting new leases in the district. As per the present data, a total 51 registered Mining leases have been granted in the District. Stone(Grit) and sand are the basic requirements for construction materials and have a good market in all regions of the State for the construction of buildings, roads, bridges, railway lines and other construction purposes. There are huge infrastructural activities such as roads, buildings, and railways are coming up by Govt. of India & PSUs. Out of the total production, approximately 70%-80% of the supply is utilized in government works, while the rest is consumed for private purposes. The certainty of the exact demand in the district depends upon various Govt projects & schemes etc, hence quite not impossible to quantify the exact demand. Certainly, there is an unavoidable gap between the demand and supply of road metal/stone in the district, hence to balance the demand-supply gap a few stone quarries have been proposed in certain areas. It is proposed to start the Stone production from larger areas to at least double the production of the district which will enhance the revenue of the State and also support the livelihood of the local people. The mining project not only brought economic benefits to the State by the ways of royalty of Stone but also benefits to the local people and lessees. It will help in general employment in rural areas in the State where the people are starving due to unemployment. A single mining project shall provide employment to approximately 10 to 20 people of the poorest section of the society and benefit more than 50 to 60 people indirectly. Further, infrastructure development will help in the development of the nation. The socio-economic condition of the area will be improved as mining activity will create additional employment for the local inhabitants to raise their socio-economic status. A significant contribution will be made by the lessee towards the societal development of the surrounding area in the form of DMFT/CSR fund.

18 Mining Leases Marked On The Map Of The District

At present about 51 Nos of mining leases (Pvt./Govt. Land) have been granted/executed and are under operation and the demand for furnished material is still high. The details of the Mining lease are as follows::

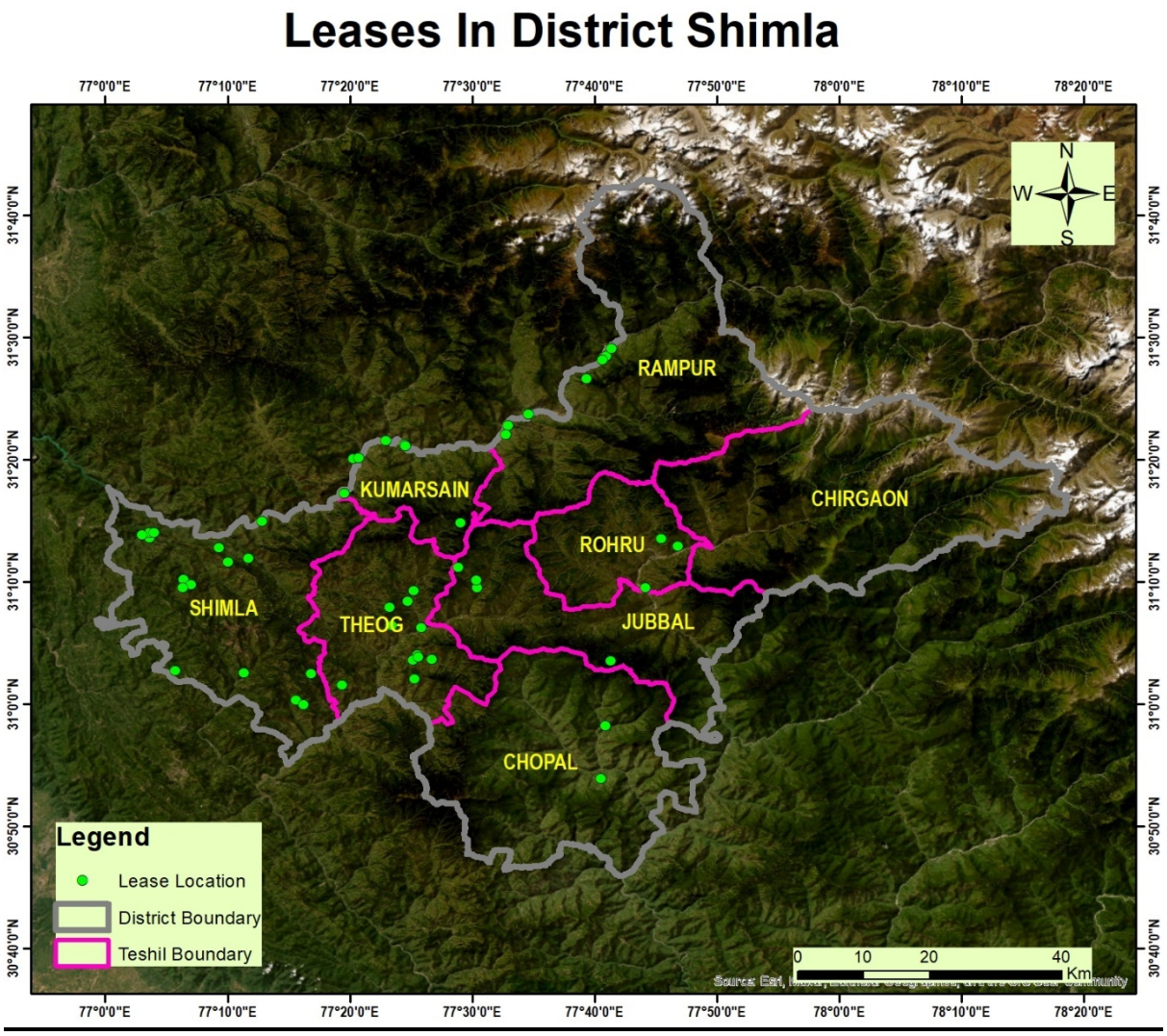


Image showing the location of the mining leases

19 Details Of The Area Of Where There Is A Cluster Of Mining Leases

The details of Quarries existing within a 500m radius are considered as clusters of Mining Leases as per the MoEF guidelines. However, there is no such cluster zone in the district as all granted leases are scattered in the entire district.

20 Details Of Eco-Sensitive Area, If Any, In The District;

There is no eco-sensitive area in Distt. Shimla

21 Impact On The Environment

Mining activities can have significant and diverse impacts on the environment across various domains, including air, water, noise, soil, flora and fauna, land use, agriculture, and forests. The specific impacts depend on factors such as the type of mining, mining methods, location, and scale of operations. Here are some common environmental impacts associated with mining:

Impact on the Air Environment

Mining operations can generate dust particles, leading to air pollution. This can affect respiratory health and contribute to soil and water pollution. In some lease surroundings, only a few households are living in the area and the population density of the village is very low. The area does not have any industrial activity in the core/buffer zone and hence, the ambient air quality of the area is good. Hence, the impact on air quality due to mining will not be significant.

Impact on Water Environment Surface

Runoff from mining sites can carry sediments, heavy metals, and pollutants into nearby rivers and streams, impacting aquatic ecosystems.

Groundwater: Improper disposal of mining waste can lead to the leaching of harmful substances into groundwater, affecting water quality.

Noise Pollution:

Blasting and Machinery Noise: Mining operations often involve heavy machinery and explosives, contributing to noise pollution. This can disturb wildlife, affect human health, and disrupt local ecosystems.

Soil Degradation:

Land Disturbance: The removal of vegetation and topsoil during mining can result in soil erosion, leading to reduced fertility and increased susceptibility to landslides.

Chemical Contamination: The deposition of mining waste on land can introduce harmful chemicals into the soil, affecting plant growth and soil quality.

Flora and Fauna Impact:

Habitat Destruction: Mining activities can lead to the destruction of natural habitats, displacing wildlife and disrupting ecosystems.

Land Use Changes:

Deforestation: Open-pit mining and large-scale extraction activities often require clearing extensive areas of forests, contributing to deforestation and loss of biodiversity.

Fragmentation: Mining can fragment landscapes, isolating populations of plants and animals and disrupting ecological connectivity.

Agricultural Impact:

Land Competition: Mining activities may compete with agriculture for land, leading to the displacement of farming communities and a loss of agricultural productivity.

Water Usage: Mining operations may compete with agriculture for water resources, affecting irrigation and water availability for crops.

Forest Impact:

Loss of Biodiversity: Mining-related deforestation can result in the loss of diverse plant and animal species, impacting overall biodiversity.

Carbon Sequestration: Forests act as carbon sinks, and their destruction during mining releases stored carbon into the atmosphere, contributing to climate change.

To mitigate these impacts, sustainable mining practices, strict regulations, proper waste management, and rehabilitation efforts are essential. Environmental impact assessments (EIAs) are often conducted before mining projects to identify potential risks and implement preventive measures

22 Remedial Measures To Mitigate The Impact Of Mining On The Environment

Mitigating the environmental impact of mining involves implementing various remedial measures to minimize negative effects on air, water, soil, flora and fauna, and overall ecosystems. Here are some common remedial measures to mitigate the impact of mining on the environment:

Remedial Measures for Air Pollution:

- All types of machinery and transport vehicles will be properly maintained and pollution checks will be done once in a year to keep the emissions from machinery and vehicles under control.
- Water sprinkling will be done on haul roads to control the emission of dust while transporting minerals and waste. Provision for water spray by tankers on 'Kuccha' road shall be done.
- Water sprinkling at the loading area.
- Tree plantation along the haul roads & approach road will be done. Plantation along the mine boundary shall be done with a tree density of 2000 trees per Hectare as per the norms of MoEF & CC, to control dust & noise.
- Use of personal protective equipment like dust masks.
- Ambient air pollution monitoring will be carried out.

Remedial Measures for Water Pollution:

- Mining is proposed to plan above the groundwater table.
- Garland drain shall be made around the Waste dump and the rainwater shall be collected in the garland drain and allowed to settle in a small pit for settling suspended particles before allowing discharge to natural drainage system.
- For domestic wastewater Septic Tank with a Soak Pit shall be provided, and discharge from the Soak Pit, if any shall be used for plantation.

Remedial Measures for Noise Pollution:

- Diesel-powered machinery, which is a major source of noise in open-cast mining shall be properly maintained. Attention shall be paid towards rigorous maintenance of the silencer of the diesel engines.
- Protective devices shall be provided for use of persons employed in the vicinity of high-noise areas.
- With the adoption of controlled blasting techniques, the ground vibrations will be minimized.
- Plantation around the lease boundary will cut the noise levels.
- Remedial Measures for Land Environment:

Some of the measures followed to minimize the impacts are as follows:

- The mining activities will be restricted within the lease area only.
- The waste material will be utilized for the construction of roads and also will be used by the local people for construction work.
- The surface runoff from the lease area will be retained within the lease and used for plantation, dust suppression and block cutting. So, there will be no soil erosion from the lease area and its surroundings due to mining activity.
- The dump will have an inward slope with catch drains at the inward side of the terrace and the catch drain of the individual terrace will be connected to the garland drain outside the periphery of the dump. The retaining wall and garland drain will be constructed around the dumps and the surface runoff water pass through the garland drain and finally settle in a settling pit before being released outside.
- **Biodiversity Conservation:** Implement conservation strategies to protect biodiversity, including the preservation of critical habitats, reforestation, and the creation of wildlife corridors.
- **Community Engagement:** Involve local communities in decision-making

processes and ensure they benefit from mining activities. This may include providing employment opportunities, supporting local infrastructure, and contributing to community development projects.

- **Closed-Loop Systems:** Design mining operations with closed-loop systems to minimize resource consumption and waste generation. This includes recycling and reusing water, materials, and energy within the mining process.
- **Monitoring and Compliance:** Establish regular monitoring programs to assess the environmental impact of mining activities. Ensure strict compliance with environmental regulations and standards.
- **Training and Awareness:** Provide training for mining personnel on environmentally friendly practices and the importance of conservation. Increase public awareness about the environmental impacts of mining and the efforts being made to mitigate them.
- **Post-Closure Planning:** Develop and implement plans for the post-closure phase of mining operations to ensure ongoing environmental monitoring, maintenance, and adaptive management.

By incorporating these remedial measures, mining operations can help minimize their environmental impact and contribute to sustainable resource extraction. It's important to recognize that effective mitigation requires collaboration among industry stakeholders, regulatory bodies, local communities, and environmental experts.

23 Reclamation Of Mined-Out Area

As per the Himachal Pradesh Minor Minerals Concession Rules, 2015, a reclamation plan is a mandatory part of the approval of the mining plan by the Geological Wing Department of Industries. In the case of hill slope or terrace mining the reclamation plan includes the planation of area. It is necessary to reclaim the land affected by mining for to following reasons:

- To put the land into productive use like agriculture, forestry or recreational purposes.
- To check soil erosion from dumps leading to the destruction of watersheds and siltation of rivers.
- Accumulation of huge quantities of water in worked-out pits may pose a threat to life and property.
- To combat adverse visual impact.

The afforestation programme is the most important programme to improve the environment and ecological balance of the area. Grasses and bushes that have fibrous roots are at the first instance grown which gives the binding property to the soil. After growing grasses

and bushes, other tree species in consultation with the experts will be raised, based on the characteristics of soil, topography and climatic conditions.

The main post-mine land use for the Project will be grazing based on a self-sustaining vegetation community using appropriate pasture grasses and scattered plantings of native tree and shrub species.

For successful reclamation following points are to be considered

- Listing inventory of pre-mining condition.
- Monitoring flexibility of mining programme in the light of efficient land reclamation.
- Evaluation of the post-mining requirements of the region and to decide on the needs and desires of the affected ground.
- To make reclamation planning suitable to the techno-economical and socio-political environment.
- To assess the physio-chemical characteristics of overburden.
- Extra cost of preservation, re-handling, spreading and levelling of subsoil and topsoil.
- Knowledge of hydrogeological/geomorphological conditions. Aesthetic and/or historic value of land.

The fast-growing plantation and re-grassing shall be done on the exhausted/excavated benches as well as in backfilled pits and will be done in consultation with local peoples or Govt. Authorities like the forest department etc. The mining lease shall be fenced properly in the entire periphery of the safety zone. The total mined-out area of the benches shall be dedicated to plantation and re-grassing. The average year-wise proposed bench area for the plantation is as under: -

a) The plantation/regressing and its maintenance cost will be borne by the applicant. Also, a green belt will be developed in consultation with the local panchayat and forest departments along approach roads in order to minimize pollution.
b) Based on the characteristics of soil, topography and climatic conditions of the area, plantation of grasses/bushes and other tree species will be done by the applicant.
c) Plantation before the onset of the monsoon season will be done progressively until the final closure of the mine.
d) Green Belt shall be properly designed in consultation with the forest department. Plantation shall be carried out as per the periodical plantation programmer.
e) Fast-growing and evergreen trees, trees with broadleaf resistance to specific pollutants and those that would maintain the regional ecological balance, soil and hydrological conditions shall be favoured.

f) Green belt area along the haul roads, buffer zone, dumping sites as well as the excavated benches shall be developed.

g) Besides this, only local labours shall be engaged for watch and ward and plantation activity with proper maintenance.

h) The plantation/regressing and its maintenance cost will be borne by the applicant. Also, a green belt will be developed in consultation with the local panchayat and forest department along approach roads in order to minimize pollution.

i) The estimated survival rate proposed to be achieved shall be 80%

24 Risk Assessment & Disaster Management Plan;

Most of the mines in the district are in Hilly areas. Since the mining benches, trenches or pits are developed on hard compact and medium-grain rocks hence, there may be a chance of possibilities of slope failure if mining activities are done in an unscientific manner. The Risk Assessment & Risk Management Plan will be prepared for the safety of man & machinery deployed in the mining activities as per Mining Act, Rules, and Regulations & DGMS circulars.

24.1 Risk Assessment:

- **Identify Hazards:**
  Conduct a thorough identification of potential hazards associated with mining activities, considering factors such as geology, equipment, processes, and external influences.
- **Risk Analysis:**
  Assess the likelihood and potential consequences of identified hazards. This involves quantifying risks to prioritize them based on severity and probability.
- **Vulnerability Assessment:**
  Evaluate the vulnerability of critical infrastructure, surrounding communities, and the natural environment to potential risks and hazards.
- **Stakeholder Engagement:**
  Involve relevant stakeholders, including local communities, government agencies, and environmental experts, in the risk assessment process to gather diverse perspectives and local knowledge.
- **Emergency Response Planning:**

Develop detailed emergency response plans for various scenarios, considering potential accidents, natural disasters, and other emergencies. Include evacuation routes, emergency shelters, and communication protocols.

24.2 Disaster Management Plan:

- **Risk Mitigation Strategies:**
  Implement risk mitigation strategies to minimize the likelihood and impact of identified hazards. This may involve engineering controls, process modifications, and the use of advanced technologies.
- **Safety Training and Awareness:**
  Conduct regular safety training for mining personnel, contractors, and local communities. Promote awareness of potential hazards and the importance of adhering to safety protocols. The required personal protective equipment should be provided and used in a manner that protects the individual from injury. A few minor injuries which can be prevented are slip, trip or fall hazards; hazards due to rock falls and collapse of unstable rocks, atmosphere containing toxic or combustible gases; protection from chemical or hazardous material etc.
- **Infrastructure Design:**
  Design mining infrastructure with safety in mind, incorporating features such as containment systems for hazardous materials, emergency exits, and protective barriers.
- **Contingency Planning:**
  Develop contingency plans for various emergency scenarios, outlining specific actions to be taken in the event of accidents, spills, fires, or other critical incidents.
- **Collaboration with Emergency Services:**
  Coordinate with local emergency services, hospitals, and law enforcement agencies to ensure a seamless response to emergencies. Conduct joint training exercises and drills to improve preparedness.
- **Emergency Equipment and Resources:**
  Maintain an inventory of emergency equipment, such as first aid supplies, firefighting equipment, and evacuation vehicles. Ensure that resources are strategically located for quick access.

A disaster management plan should be prepared for taking care of any disaster. Other risks that are included in this category are noise, as it occurs and it can lead to permanent disability. There are problems related to road traffic in and out issuers; inappropriate exposure of moving machines; mechanical failure and because of the large number of moving trucks and

dumpers there is a large quantity of dust present in roadways which affects the operators and can lead to accidents

By integrating comprehensive risk assessments and disaster management plans into mining projects, companies can enhance the safety of their operations, protect the environment, and contribute to the well-being of surrounding communities. It is essential to work closely with regulatory bodies and local stakeholders throughout the planning and implementation processes.

25 Details Of The Occupational Health Issues In The District

The persons employed in the mines are exposed to a number of hazards at work which adversely affect their health. Some of the important ones are dust, noise, heat, humidity, vibration etc. In recent times, there has been increasing awareness among the mining industry and workers about occupational diseases such as Coal Worker's Pneumoconiosis, Silicosis, Manganese Poisoning, Hearing Impairment etc. caused by exposure to health hazards at work. Almost all occupational diseases are known to cause permanent disablement and there is no effective treatment. However, most of the occupational diseases can be prevented by adopting proper occupational health measures and engineering control of airborne dust at the workplace. Following diseases have been notified as the diseases connected with mining operations for the purpose of sub-section (1) of Section 25 of the Mines Act, 1952:

In order to detect occupational diseases, the health surveillance programme shall be adopted in mines which includes:

- Initial Medical Examination of persons to be employed in mines.
- Periodic Medical Examination once every five years. General physical examination, chest radiographs, lung function tests and audiometrics.
- Classification of chest radiographs of workers as per ILO Classification.
- Medical examination within one year of superannuation.
- Evaluation of all cases of suspected pneumoconiosis by Pneumoconiosis Medical Board.

Maintenance of medical records till the person is in service and 10 years thereafter. The cases of silicosis detected during health surveillance programmes are referred to as Pneumoconiosis

As per the available record of five-year data, no patients of Silicosis & Tuberculosis have been adversely affected or reported due to the mining activities in the District

26 Plantation And Green Belt Development

Mining in the case of hill slope and terrace deposits is carried out by the formation of benches the height of the benches can vary from 2mX2m, 4mX4m, and 6mX6m, depending on the nature of the rock or deposits and the dimensions of the lease area. It is recommended to the lessee that a separate place has to be kept for dumping the topsoil which can be later on used for plantation purposes and re-grassing. As the mining operations are carried out from the top of the mining lease to the bottom, therefore, plantation and re-grassing have to be done every year on the excavated benches.

The fast-growing plantation and re-grassing shall be done on the exhausted/excavated benches as well as in backfilled pits and will be done in consultation with local peoples or Govt. Authorities like the forest department etc. The mining lease shall be fenced properly in the entire periphery of the safety The green belt along the lease boundary and both sides of the transportation road shall be developed in almost all the existing leases in the district. Maximum numbers of plants shall be planted each year around the lease boundary and both sides of the transportation road as mentioned in the mining plan. Some mine owners also planted a large number of plants outside the lease area to develop a green belt in the district. Deodar, Sal, Khair Pine, Cheil, etc. are some important plants commonly planted Shimla district.

In some cases where the nature of the rock is hard and there is no scope for plantation. lessee is asked to acquire a dedicated land from the private or local govt. bodies for plantation. Plantation is done in consultation with the forest department and local bodies.

A detailed record of the plantation is to be kept by the respective owner/agent/manager of the mine every year, which has been planted in the safety zone area and transport route, which is statutorily required. As per the norms of the Forest department, the plantation has to be carried out at the rate of 2500 local plants per hectare and along the roadside, at an interval of 2 meters in a zig-zag manner on both sides.

27 Other Information

The protection of mineral reserves as well as their sustainable exploitation for development use is one of the concerns of the State Government. As land and mineral reserves are the most important capital assets, protection of such capital assets would be a legitimate plan activity. Therefore, it is the responsibility of the state government to take an effective action plan to combat illegal mining and lifting which has led to huge revenue loss to state exchequer.

Provisions shall be made in the mining plans to protect the environment, though there are no trees in the mining area, even then intensive care will be taken to protect the nearby trees and to make the arrangements with the consultation of the Forest Department to make

compensatory plantation & contribution to the Van Mahotsav events etc. Proper arrangements shall be made to dump the waste generated from the mining activities. The topsoil and silty clay will also be dumped at proper places as per suggestions made in the mining plan. So, that it can be used for plantation or agriculture purposes after the mining is over.

Also, it is accepted that effective resource management cannot be done in isolation. The proponent therefore vigorously pursues approaches towards coordination and integration where possible, so as to lead to coordinated regulatory systems.

28 MONITORING & EVALUATION

The Ministry of Environment, Forest & Climate Change has published "Enforcement & Monitoring Guidelines for Sand Mining" in the year 2020 wherein Monitoring Mechanism has been defined very specifically and recommended that a uniform monitoring mechanism is required to assess the regulatory provision in quantitative terms, with robust institutional and legal framework. Based on past experience and suggestions available, the following requirements are suggested for defining a mechanism for monitoring of mining activities which will help in identification of mining which is operating either illegally or are violating the regulatory provisions. Some suggestion will facilitate direct or indirect information to help in such an assessment.

1. All precaution shall be taken to ensure that the water stream flows unhindered and process of Natural river meandering doesn't get affected due to mining activity.
2. River mining from outside shall not affect rivers, no mining shall be permitted in an area up to a width of 100 meters from the active edge of embankments or distance prescribed by the Irrigation department.
3. The mining from the area outside river bed shall be permitted subject to the condition that a safety margin of two meters (2 m) shall be maintained above the groundwater table while undertaking mining and no mining operation shall be permissible below this level unless specific permission is obtained from the Competent Authority. Further, the mining should not exceed nine-meter (9 m) at any point in time.
4. Survey shall be carried out for identifying the stretches having habitation of freshwater turtles or turtle nesting zones. Similarly, stretches shall be identified for other species of significant importance to the river eco-system. Such stretch with adequate buffer distance shall be declared as no-mining zone and no mining shall be permitted. The regulatory authority as defined for granting Environmental Clearance, while considering the application of issuance of ToR and/or EC for the adjacent block (to non-mining zone) of mining shall take due precaution and impose requisite conditions to safeguard the interest of such species of importance.
5. District administration shall provide detailed information on its website about the sand mines in its district for public information, with an objective to extend all information in public domain so that the citizens are aware of the mining activities and can also report to the district administration on any deviation observed. Appropriate feedback and its redressal mechanism shall also be made operational. The details shall include, but not limited to, lease area, geo-coordinates of lease area and mineable area, transport routes, permitted capacity, regulatory conditions for operation including mining, environmental and social commitments etc.
6. A website needs to be maintain to track the movement of centralised sand mining and a Centralised server system should be made to manage the data related to sand mining across India.
7. The mineral concession holders shall maintain electronic weighbridges at the appropriate location identified by the district mining officer, in order to ensure that all mined minerals from that particular mine are accounted for before the material is dispatched from the mine. The weighing bridge shall have the provision of CCTV camera and all dispatch from the mine shall be accounted for.
8. The mineral movement shall be monitored and controlled through the use of transit permit with security features like printing on IBA approved MICR papers, Unique bar/QR, fugitive ink background, invisible ink mark, void pantographs and watermarks papers or through use of RFID tagged transit permits and IT /IT-enabled services. Such monitoring system shall be created and made operationalised by State Mining department and district level mining officer shall be responsible for ensuring that all

legal and operational mines are connected and providing the requisite information on the system.

9. State Government shall constitute a District Level Task Force (DLTF) under the Chairmanship of Deputy Commissioner/District Magistrate/Collector with Superintendents of Police and other related senior functionaries (District Forest Officer, District transport officer, Regional officer- SPCBs, Senior Officer of Irrigation Department, District Mining Officer) with one/two independent member nominated by the Commissioner concerned. The independent member shall be retired government officials/teacher or ex-serviceman or ex-judiciary member. The DLTF shall keep regular watch over the mining activities and movement of minerals in the district. The DLTF shall have its regular meeting, preferably every month to reconcile the information from the mining activity, and other observations made during the month and take appropriate corrective and remedial action, which may include a recommendation for revoking mining lease or environmental clearance. The DLTF may constitute an independent committee of the expert to assess the environmental or ecological damage caused due to illegal mining and recommend recovery of environmental compensation from the miner's concern. The recommendation may also include action under the provision of E(P) Act, 1986.

10. The area not identified for mining due to restriction or otherwise are also to be monitored on a regular basis by the DLTF. Any observations of mining activity from the restricted area shall be reported and corrective measures shall be initiated on an urgent basis by the DLTF.

11. The dispatch routes shall be defined in the Environmental Clearance and shall be avoided through densely habituated area and the increase in the number of vehicle movement on the road shall be in agreement with the IRC guidelines / carrying capacity of the road. The alternate and dedicated route shall be explored and preferred for movement of mining to avoid inconvenience to the local habitat. The mining production capacity, by volume/weight, shall be governed by total permissible dispatch calculated based on the carrying capacity of dispatch link roads and accordingly, the production should be regulated.

12. The movement of minerals shall be reconciled with the data collected from the mines and various Naka/check posts. Other measures may also include a general survey of the potential mineable area in the district which has not been leased/auctioned or permitted for mining due to regulatory or other reasons.

13. The location and number of check post requirement shall be reviewed by DLTF on a regular basis so that appropriate changes in location/number could be made as per the requirement. Such review shall be carried out on a regular basis for the district on inter-state boundary or district providing multiple passages between two districts of different states.

14. The district administration shall compile the information from their district of the permitted and legal mined out minerals and other details and share such information and intelligence with the officials of the adjoining district (Inter or/and Intra State) for reconciliation. The information shall include the area of operation, permissible quantity, mined out minerals (production) the permitted route etc., and other observations, especially where the mine lease boundary is congruent with the district boundary. Such coordination meeting shall be held on a quarterly basis, alternatively in two district headquarters or any other site in two districts decided mutually by the District Magistrate.

15. The in-situ and ex-situ environmental mitigative measures stipulated as EMP, CER, CSR and other environmental and safety conditions in mines including the welfare of labours shall properly reflect in the audit report.