DISTRICT SURVEY REPORT-2024
KULLU DISTRICT, 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 69th (A) meeting held on dated 20th August, 2024 vide Agenda Item No. 1.

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)				
(2)				

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						

Contents

PART I
DISTRICT SURVEY REPORT OF DISTRICT KULLU, HIMACHAL PRADESH

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 the 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. Mining sector is an important segment of the Indian economy. Since independence, there has been a pronounced growth in the mineral production both in terms of quantity and value. India produces as many as 87 minerals, which includes 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 mineral have been defined under section 3(e) of 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 large sector and in small sector. The large sector comprises of limestone projects for manufacturing cement and other lime products while the small mining sector comprises mining of minor minerals like sand, stone, bajri, slate, shale and clay etc. which are basically building material to meet up the demand for infrastructure development of the state.

In pursuance to the orders of 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 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 Imapact Assessmenyt 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 District Survey Report during the year 2016 and the said District Survey Report prepared for District Kullu 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 application for Environment Clearence, 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 Kullu 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, stream and other sources. The mineral potential has been calculated based on field investigations taking in to consideration the geology of the catchment area of the river/streams and other sources.

2. OVERVIEW OF MINING ACTIVITY IN THE DISTRICT

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 Kullu, 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 Kullu 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 River bed 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 shall be 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 31 Nos of mining leases (Pvt./Govt. Land) have been granted/executed and are under operation, However, the demand for furnished material is still high. The details of the Mining leases are as follows:

Mining Leases in the District Mandi with location, area and period of validity

Sr. No	Name & Address of Leases	Khasra No./Location (in Mauza, Mohal)	Area (Hectares/ Bighas)	Period in Years	Total production as per mining plan in five year.	Status (Working/ Non Working
1.	Sh. Sangat Ram S/o Sh. Chim mnu Ram , Village Moin, P.O. Nirath, Sub-Tehsil Nether, Distt. Kullu H.P.	Khsra No. 2565/1 & 5724/2552/1	04-13 Bighas Pvt Land	28-11-2020 For 05 years	29100 MT	Working
2.	Sh. Prabhu Dyal S/o Sh. Thakur Dass , Village Moin, P.O. Nirath, Sub-Tehsil Nether, Distt. Kullu H.P.	Khasra No. 2329,2368,2369/1,2369/2, 2370 & 2369/3	06-02-00 Bighas Pvt Land	21-02-2020 For 05 years	49528 MT	Working
3.	Sh. Harish Goswami S/o Sh. Bal Mukund , V. P.O. Koil, Sub-Tehsil Nirmand, Distt. Kullu H.P.	Khsara No. 1315 & 1322	07-01-00 Bighas Pvt Land	20-11-2020 For 10 years	61654 MT	Working
4.	Sh. Ashok Kumar S/o Shyam Lal, Village Moin, Tehsil Neether, Distt. Kullu	Kh. No. 2528	03-05 Bighas	6-03-2021	35244 MT	Working
5.	M/s SJVNL ,Luhri Hydro-Electric Project , Bithal P.O. Samathla, Tehsil Kumarsain Distt. Shimla H.P.	Kh. no. 2606,2607, 2610, 2611, 2617, 2618 to 2625 (Pvt Land) and Tukra No.7 Govt. Land	04-67 Hectare Mauza	17/09/2021	626200 MT	working
6.	M/s SJVNL, Luhri Hydro-Electric Project, Bithal P.O. Samathla, Tehsil Kumarsain Distt. Shimla H.P.	Tukra No.-2(Govt. Land)	03-81-44 Hectare	17/09/2021	498679 MT	working
7.	Sh. Rakesh Verma S/o Late Sh. Bansi Lal Verma ,Village Bashong ,P.O. Sariun ,Tehsil Theog, Distt. Shimla, H.P.	Kh. No. 2630,2632,2633 &2634 Mauza/Mohal Neether, Tehsil Nirmand,	Totaling 10-07-00 bighas (Pvt. Land)	29/08/2022 for ten years	172125 MT	working
8.	Sh. Subhash Sharma, Village Rewari, P.O. Dalash, Tehsil Neether, Distt. Kullu H.P.	Kh.No.457,2458,2459,2460/ 1,2478 , Mauza/Mohal Neether, Tehsil Nirmand.	07-12 bighas Pvt. Land	19/07/2022	53880 MT	Non working
9.	Naresh Kumar S/o Late Sh. Bala Ram ,Village Moin, PO Nerath, Sub-Tehsil Nither ,.Distt. kuulu H.P.	Kh. no. 2564,2566,2560 &2561 Mauza/Mohal Neether, Tehsil Nirmand	08-18 Bighas	18/11/2021 for five years	68109 MT	Non – working
10.	Virender Kumar S/o Jia Lal village Jamedi, P.O. Luhri, Tehsil Anni, Distt. Kullu, H.P.	Kh. No. 552	03-11-0 Bighas	20/04/2023 for five years	43564 MT	Working
11.	Bhoop Singh S/o Amar Chand Village Gagni P.O. Arsu, Tehsil, Nirmand, Distt. Kullu, H.P.	Kh. No. 1321	04-07 Bighas	03/05/2023 for five years	38665 MT	Working
12.	Veer Singh S/o Salig Ram Village Chiyuni Moin , Po Nerath, Sub-Tehsil Nither ,Distt. Kullu, H.P.	Kh. No. 2637 and 2640	06-05 Bigha	14/06/2023 for five years	21759 MT	Non Working
13.	Jitender Kumar Ram Village Gaura , PO Durah, Sub-Tehsil Nither ,Distt. Kullu, H.P.	Kh. No.2502/2 2504, 2505,2506	07-06 Bigha	01/06/2023	84090 MT	Non working
14.	Sh. Atul Sharma S/o Sh. M.D.	Kh.No.2643,2642,2641/2,26	20-11 Bighas	01-08-2023	175531	Working

	Sharma, Vill. Sainj, P.O. Kirti, Tehsil Kumarsain, Distt. Shimla, H.P.	35/1,2641/1,2645,2646/1,2635/3,2635/2 & 2646/2		for 5 Years	MT	
15.	Sh. Rakesh Verma S/o Late Sh. Bansi Lal Verma ,Village Bashong ,P.O. Sariun ,Tehsil Theog, Distt. Shimla, H.P.	Kh. No. 2626/1,2627,2628 &2629 Mauza/Mohal Neether, Tehsil Nirmand,	Totaling 08-02-00 bighas (Pvt. Land)	16/11/2023 for five years	175531 MT	working
16	Sh. Sher Singh S/o Sh. Nandu Ram Prop. M/s Chaturbhuja Stone Crusher, Vill. Tharas PO Hurla Tehsil Bhunter Distt. Kullu, H.P.	Kh. No. 4334, 4412,4337 & 4585/2320 Maua/ Mohal Bhallan Rot-II , Tehsil Bhunter, Distt. Kullu H.P.	8-13 Bighas (Pvt. Land)	16-03-2020 for 10 years	87885 MT	Working
17	Sh. Ravinder Kumar Gupta, Vill. Jauni Ropa, PO Neoli, Tehsil & Distt. Kullu, H.P.	Kh. No. 3827/3599/3104/2	19-00-00 Bighas	14-12-2020 for 05 years	163000 MT	Working
18	Sh. Sher Singh S/o Sh. Nandu Ram Prop. M/s Chaturbhuja Stone Crusher, Vill. Tharas PO Hurla Tehsil Bhunter Distt. Kullu, H.P.	Kh. No. 4217/2266, 4218/2266, Maua/ Mohal Bhallan Rot-II , Tehsil Bhunter, Distt. Kullu H.P.	6-14 Bighas (Pvt. Land)	16-03-2020 for 10 years	96100 MT	Working
19	Sh. Om Prakash Sharma S/o Sh. Jyoti Prakash, Vill. Near New Bridge Parla Bhunter Tehsil Bhunter, Distt. Kullu, H.P.	Tukra No. 1 ,Mauza Chaunti Bihal, Phati Dayar, Kothi-Kot Kandi, Tehsil Bhunter, Distt. Kullu.	13-14-10 Bighas	01-02-2021 for 15 years	62400 MT	Working
20	M/s NHPC PHEP, Stage-II ,Nagwain ,Tehsil Aut Distt. Mandi H.P.	Khasra No. 4745/2	13-00-00 Bighas	5 years	43165 MT	working
21	Sh. Rajender Singh M/s Ashapuri St.Cr.VPO Hurla,Tehsil Bhunrter Distt. Kullu H.P.	Khasra No. 2888/2567/2	21-03-12 bighas	5 years w.e.f.03/02/2022 to 02/02/2027	105000 MT	Non-working
22	Sh. Vikas Sohal Prop:M/s Himalyan Stone crusher,Village Bhatgran, PO Pepalage,Tehsil Bhunter,Distt. Kullu H.P.	Kh. No. 2882, 3669/1, 3670/1 &3671/1	16-19-07 bighas	23/05/2022 For five year	180551 MT	working
23	Sh. Rajesh Kumar ,Village Tikoli ,P.O. Panarsa, Tehsil Aut, Distt. Mandi H.P.	Kh. No. 5377/2	14-00-00 Bighas	11/03/2022 Five years	195540 MT	Non-working
24	Sh. Hiteshwar Singh S/o Maheshwar Singh Prop: M/s Drishti St. Cr. VPO Hurla, Tehsil Bhunter Distt. Kullu,H.P.	Kh. No. 2935/1	10-00 Bighas	13/09/2022	64000 MT	working
25	Sh. Abhishek Thakur Prop. M/s Murari Mata St. Cr. V.P.O. Larji, Tehsil Balichowki, Distt. Mandi. H.P.	Tukra No. –I . Distt. Kullu H.P.	Diverted Forest Land 29-15 Bighas.	01/02/2021 for 15 years	142902 MT	Working
26	Thakur Dass S/o Paras Ram Village Maraur, P.O. Panihar, Tehsil Banjar, Distt. Kullu, H.P.	Kh. No.903/683, 904/683 &909/683 (Pvt.Land)	09-10-00 Bighas	12/04/2023	30000 MT	working
27	Sh. Atul Sharma S/o Sh. M.D. Sharma, Vill. Sainj, P.O. Kirti, Tehsil Kumarsain, Distt. Shimla, H.P.	2643,2642,2641/2,2635/1,2641/1/2645,2646/1,2635/3 and 2635/2	20-11 Bighas.	01-08-2023 for 5 Years	175531 MT	Working
28	Sh. Rajender Singh M/s Ashapuri St.Cr.VPO Hurla,Tehsil Bhunrter Distt. Kullu H.P.	Khasra No. 3049 Mauza Diyar	12-10 -00 bighas	5 years w.e.f.03/02/2022 to 02/02/2027	177519 MT	Non-working
29	Sh. Kuldeep Chand Village Niyahi, P.O. Kanaun, Tehsil Sainj, Distt. Kullu, H.P.	Kh. No 2417 Mauza Mohal Dhaugi Kothi Bunga	Measuring 05-01 Bighas	01/112023 to 31/10/2028	38250 MT	working
30	Sanjay Kumar S/o Ram Swaroop Village Shawad	Kh No 2416,2420,and 2421 m	05-14 Bighas	07/03/2024 to	43800 MT	working

	Mandar, P.O. Shawad, Tehsil Anni ,Distt. Kullu,H.P.			06/03/2029		
31.	Sh. Atul Sharma S/o Sh. M.D. Sharma, Vill. Sainj, P.O. Kirti, Tehsil Kumarsain, Distt. Shimla, H.P.	Kh.No.6250/5724/2552 &6252/25652	04-11 Bighas	07-03-2024 for 5 Years	45900 MT	Working

**At present there is no mining lease (Pvt/Govt) has been granted for the extraction of sand and aggregates in riverbed*

4. DETAILS OF ROYALTY OR REVENUE RECEIVED IN THE LAST FIVE YEARS

Details of Royalty or Revenue received in the last five years				
FY	Details of Royalty	Details of DMFT	Expenditure	No. of Project sanctioned
2018-19	3,91,43,359	12,51,167/-	Nil	Nil
2019-20	7,19,50,353	6,46,380/-	Nil	Nil
2020-21	10,61,27,093/-	16,38,383/-	Nil	Nil
2021-22	4,83,82,531/-	18,82,209/-	Nil	Nil
2022-23	9,22,25,847/-	21,97,337/-	3,68,163/-	10

5. DETAIL OF PRODUCTION OF SAND OR BAJRI OR MINOR MINERAL IN LAST FIVE YEARS

Detail of Production of Sand or Bajri or minor mineral in last Five years				
FY	Boulders	Aggregate	Sand	Slate
2018-19	732410	Nil	Nil	Nil
2019-20	421762	Nil	5683	Nil
2020-21	488274	Nil	1100	Nil
2021-22	488526	52850	11954	Nil
2022-23	856012	25341	55826	Nil

Detail of Production of Stone, Slate, Cut stone or other minor mineral in last three years				
FY	Slate/Rough slab slate	Rough Stone	Cut Stone	Other Minor Mineral
2018-19	1038	Nil	Nil	Nil
2019-20	1266	Nil	Nil	Nil
2020-21	543	Nil	Nil	Nil
2021-22	1004	Nil	Nil	Nil
2022-23	nil	Nil	Nil	Nil

6. 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 occurs during floods.

Rivers can be called open as well as underground circulatory systems of a continent and in the case of the Kullu district of Himachal Pradesh River Beas and River Parvati 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.

6.1 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 time 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.

6.2 Major Rivers of Kullu District

Kullu district is drained by one major river; the River Beas and in addition to this river there are three other secondary rivers namely; River Parvati which drains central part of the Kullu district, River Sainj which drains the central southern part of the district and River Tirthan which drains the southern part of the district. In the extreme southern part, there are two small tributaries that join the River Sutlej in the Shimla district. Kullu district is occupied mainly by one river basin called as Bear River Basin which is contributed by various river tributaries.

6.2.1 River Beas

The Beas River rises in the Himalayas in central Himachal Pradesh, India, and flows for some 470 kilometres (290 mi) to the Sutlej River in the Indian state of Punjab. Its total length is 470 kilometres (290 mi) and its drainage basin is 20,303 square kilometres (7,839 sq mi) large. The river rises 4,361 metres (14,308 ft) above sea level on the southern face of Rohtang Pass in Kullu district. It traverses the Mandi District and enters the Kangra District at Sandhol, 590 metres (1,940 ft) above sea level. During its lower course, the Beas is crossed by numerous ferries, many of which consist of inflated skins (darais). Near Reh in Kangra District it divides into three channels, which reunite after passing Mirthal, 300 metres (980 ft) above sea level. On meeting the Sivalik Hills in Hoshiarpur, the river sweeps sharply northward, forming the boundary with Kangra District. Then bending around the base of the Sivalik Hills, it takes the southerly direction, separating the districts of Gurdaspur and Hoshiapur. After touching the Jullundur district for a short distance, the river forms the boundary between Amritsar and Kapurthala. Finally, the Beas joins the river Sutlej at the south-western boundary of Kapurthala district of Punjab after a total course of 470 kilometres (290 mi). The chief tributaries are Bain, Banganga, Luni and Uhal. The Sutlej continues into Pakistani Punjab and joins the Chenab River at Uch near Bahawalpur to form the Panjnad River; the latter in turn joins the Indus River at Mithankot. The waters of the Beas and Sutlej rivers are allocated to India under the Indus Waters Treaty between India and Pakistan.

6.2.2 Parvati River

Parvati River is a river in the Parvati Valley in Himachal Pradesh, northern India that flows into the Beas River at Bhuntar, some 10 km south of Kullu. It rises from the Man Talai Glacier below the Pin Parbati pass and flows in a gradual curve from north-northwest to west-southwest past the important temple town of Manikaran.

The river valley has been a route to various places: Lahul across the Sara Umga La Pass, Spiti across the famous Pin Parbati Pass, and the recently discovered (1995) Debsa Pass. The river has fine first-growth forests in its upper reaches which are being degraded as a consequence of the development of its vast hydroelectric potential. There are geothermal springs on the banks of the river at Manikaran and Khirganga.

Parvati River has Pandav Nala, Tosh Nala, Manikaran Nala and Malana Nala as major tributaries on the right side and Kalga Nala, SarNala, Grahan Nala, Shat Nala and Charraur Nala on the left side.

6.2.3 Sainj and Tirthan Rivers

The Sainj valley and the Tirthan valley are two sister valleys in the Kullu region. The route to Sainj is via Kullu and then on to Larji after passing close by Aut. The region is thick with forest as there have not been much of manmade projects unlike what has happened in most other similar regions. Yet,

between the Sainj and the Tirthan valleys, the Sainj has suffered somewhat more than the Tirthan due to unplanned projects launched for hydroelectric power generation in the Sainj valley and stream. Sainj is some 35 km by road from Kullu. The scenic beauty of the surroundings would surely capture any tourist's heart while travelling towards their destination. The distinction between the Sainj and the Tirthan, which starts from the same glacier and then end up at the Beas at the same spot also, after travelling their own separate routes, is the colour of the water. The Sainj River has water that is silty and muddy in appearance while the Tristan has clear and green-tinted water flowing in it.

The Sainj River has further smaller tributaries namely Parkachi Thach Nala, Shansher Nala, and Seund Nala on the right side and Shangarh Nala on the left bank. Similar to the Tirthan River, Ghushaini Nala and Shapnil Nala are on the right side and Shoja Nala/Stream, Banjar khad and Manglor Khad are on the left side. Apart from these tributaries, the Beas River has Solang Nala, Old Nala, Fozal Nala, Sarvari Nala and Mohal Khad on the right side and Palchan Nala, Jagat Sukh Nala, and Aleo Nala on the left side.

6.3 Drainage Pattern

The river Beas and its tributaries mainly drain more than 80% of the district. This river originates in the Pir-Panjal range, at an elevation of about 4000m and is joined by a number of tributaries viz. Parbati, Hurla, Sainj etc. All the tributaries are perennial in nature. The Beas River flows towards a south-southwest direction under a steep gradient up to Larji and thereafter, it becomes gentler. Besides Beas, the Sutlej river forms a border between Shimla and Kullu district and flows in a south-easterly direction. Both the rivers are flowing in their youth stages as indicated by the 'V' shaped river profile and deeper river channels. The Beas River maintains a longitudinal and consequent relationship in its upper course and after Larji it takes a knee-bend-type turn towards the west. The river is joined by subsequent rivers i.e. Parbati, Hurla, and Sainj on its left and right banks. Several streams on their southern side in the Kullu district join these subsequent rivers.

S. No	Name of River	Area Drained (Sq. Km)	Percentage Area Drained in the district
1.	Beas River	1415	25.73
2.	Parvati River	2045	37.18
3.	Sainj River	745	13.55
4.	Tirthan River	580	10.55
5.	Satluj River	715	13.00

The drainage pattern of River Beas 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

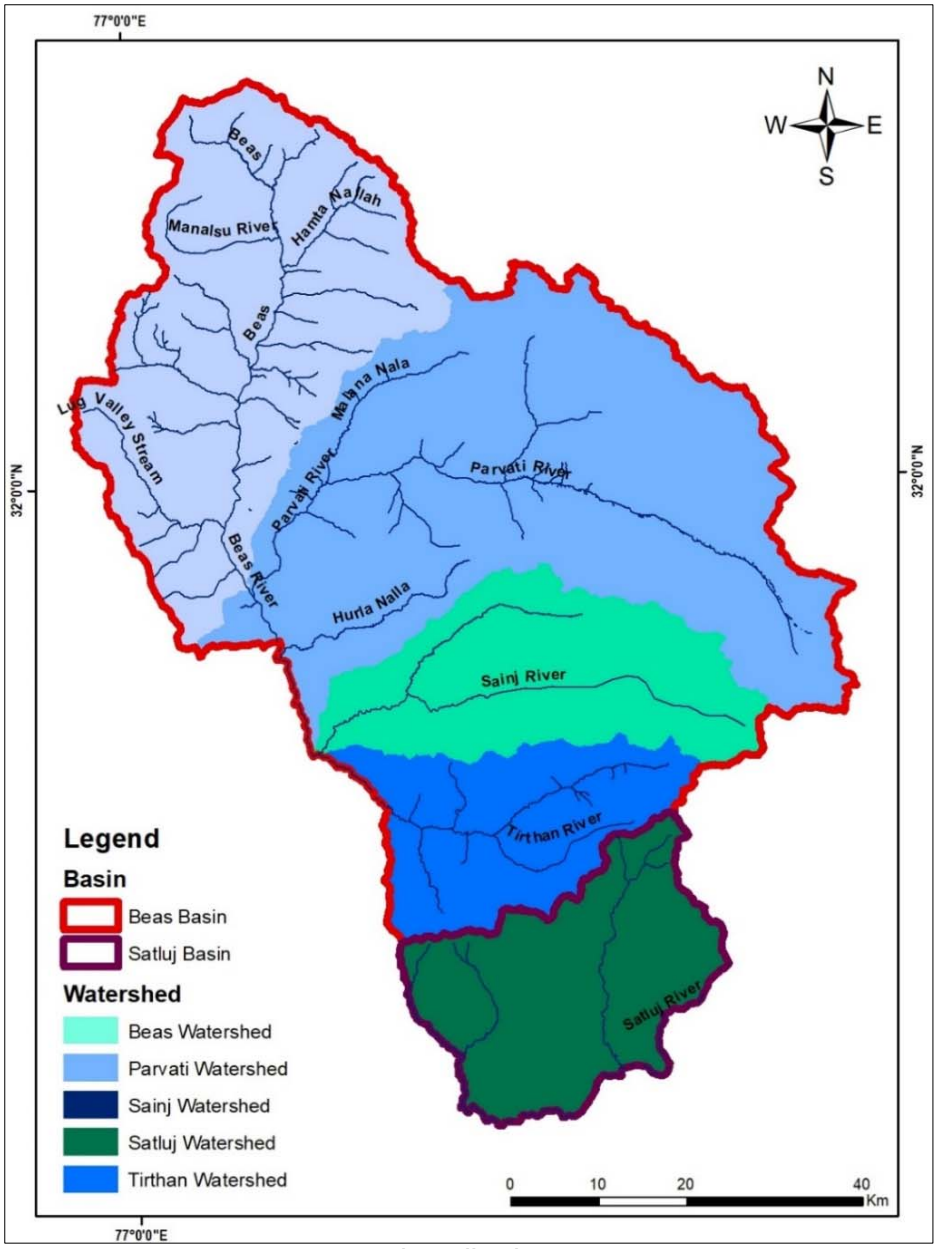


Fig: Kullu Distt

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.

Further, the dendritic pattern in the Kullu 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 Kullu 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.

6.4 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.

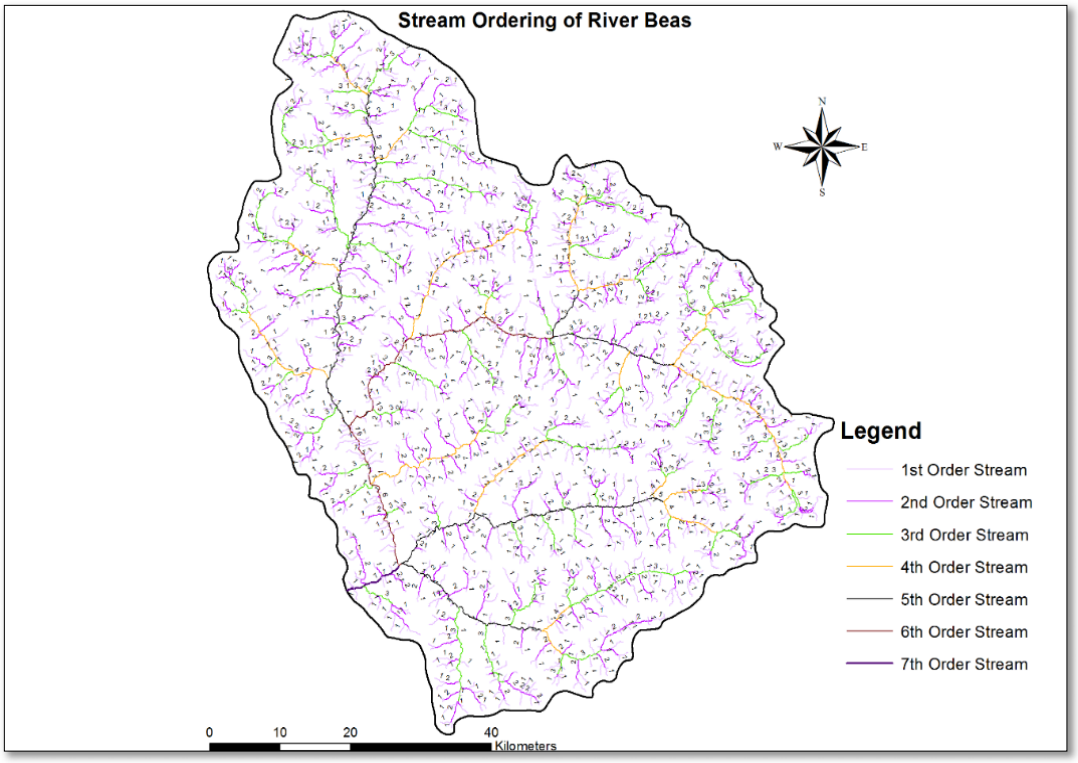


Figure Showing the Stream ordering of the river Beas in the District

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 Beas River in the Kullu district is a 7th-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.

6.4.1 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.

6.4.2 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.

6.5 Water Basin Geometric Analysis

The water basin of River Beas covers an area of 5068 sq km in the Kullu district and drains almost the entire Kullu except the extreme south. The water basin covers important tourist spots namely Bhunter, Kullu, Manali, Manikaran, Solang and Palchan and encompasses beautiful valleys of rivers Beas, Parvati, Sainj and Tirthan.

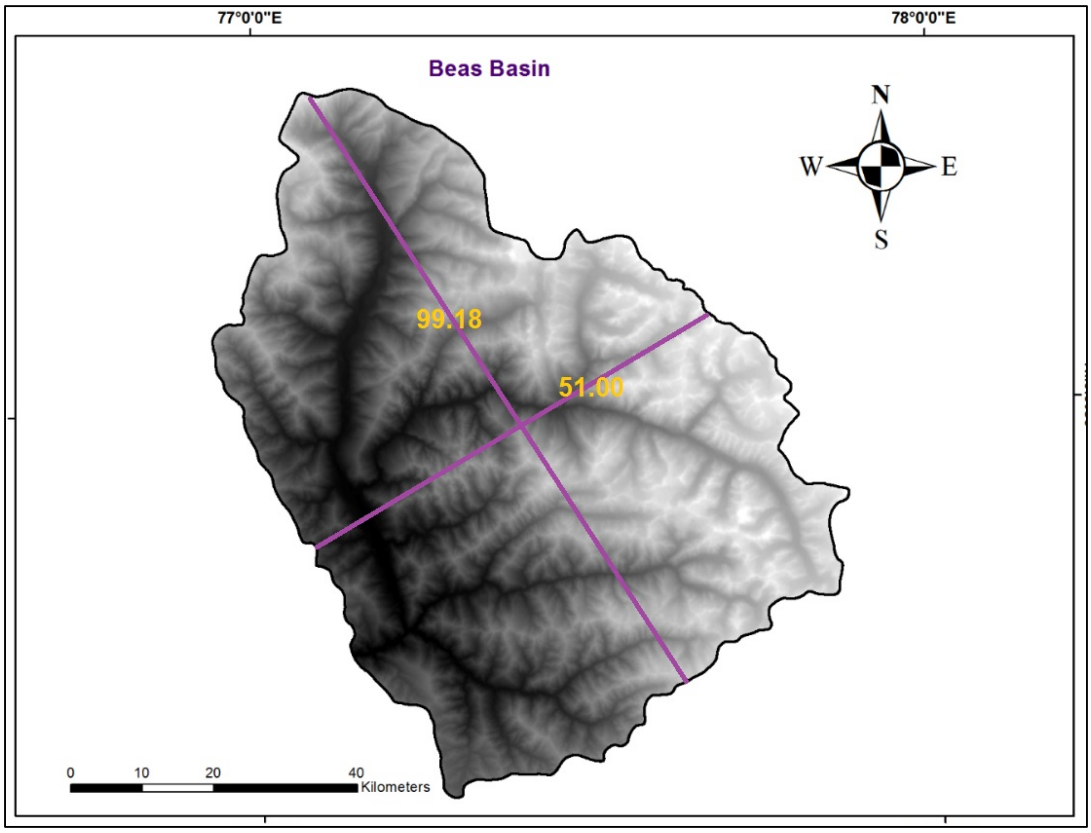


Figure Showing the length-breadth ratio of the river Beas in the District

The highest point of the water basin is about 6443 meters and the lowest point is 899 meters and entire water basin has an asymmetric geometry having an average length (L) along the main stream of about 99.18 Km. The breadth (B) of the said area then can be calculated as:

B = Area/ L
Hence the breadth is about 51 Km.

The length-breadth ratio of the Beas River basin in the Kullu district comes out to about 1.9 which means higher asymmetry. Further, the higher the ratio higher the asymmetry.

6.6 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.

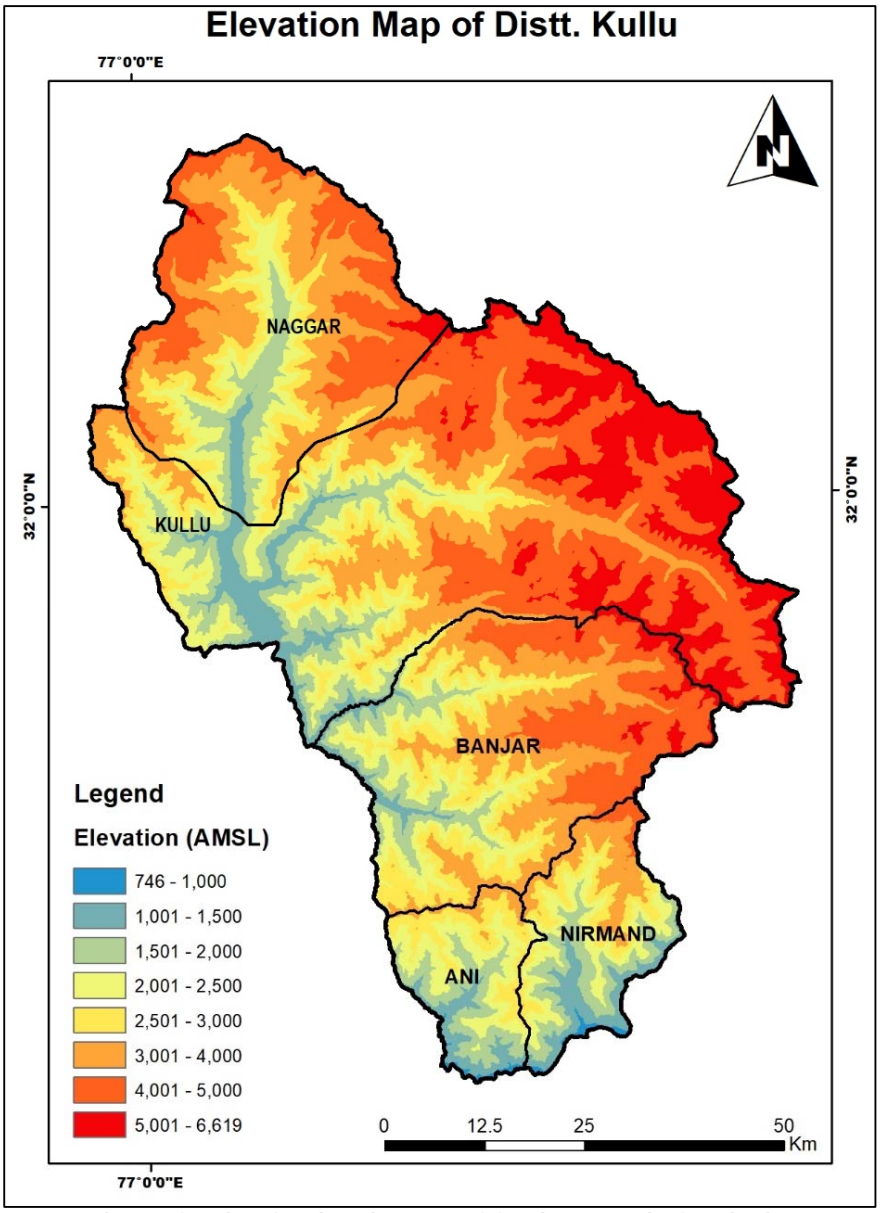


Figure Showing the elevation map of the river Beas in the District

6.7 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.

6.7.1. Tonnage Factor

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 Beas River System in the Kullu 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 Kullu 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.

6.7.2 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 the Kullu district ranges from 914m to 4084m above mean sea level with varied agro-climatic conditions. Geomorphologically the Kullu district can be broadly divided into two regions i.e. the Beas catchment area and the Staluj 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.

I) Mountainous area- Dhauladhar and Pir-Panjal ranges trend NW-SE and peaks ranging in height between 4200-5000m above mean sea level.
II) Snow-covered area- Northern and northeastern parts of the Kullu district are covered with snow and a snow line exists in this area.
III) Denuded hills- The presence of residual ridges along the intermontane valleys suggests that these ridges are the remnants of high-relief mountains and formed active erosion.
IV) Valley area - Fluvial processes and structural disturbances in the area form intermontane valleys. Kullu valley is elongated and broadly v-shaped in cross-section and denuded hills along the sides.
V) Terrace area- A number of terraces are formed along the river valleys in Kullu district. Terraces are generally noticed on the western bank of the Beas River as well as on the Eastern banks of the Satluj River Two levels of terraces are demarcated near Bhunter, which are covered with thick vegetation.

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.

6.8 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 Beas, Satluj and its tributaries including the Parvati River, Sainj River, and Tirthan River etc. 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.

6.9 Mineral Deposits Stretches

In the Kullu district many Mineral Deposit Stretches and some locations have been observed and discovered in the River Beas and Satluj basin by a team of Geologists, the Mining officer of the concerned District and other officials from the department.

The purpose of carrying out this study is to understand the behavior and quantity of deposition in the River Beas and Satluj and its tributaries. In these rivers river bed material extraction activities have been carried out. In this scenario, it is important to study the replenishable material and amount of deposition taking place before and after monsoon. This study will help in determining the deposition at the mining sites and also the extent of extractable amount of river bed material from the river if any. Furthermore, the continuous flow of rivers is essential for ecological and economic needs such as irrigation and biodiversity, etc. Therefore, a replenishment study of the river helps to understand the potential carrying capacity of water during monsoon season.

6.8.1 Stretch 1: From Burwa to Vashisht (14 KM)

This mineral stretch encompasses a maximum length of 14 kilometres from Burwa to Vashisht. The total deposition in this length is by the weathering and flood erosion of glaciated material which is calculated at about 19687500 MT.

Average Length (M)	*Average Breadth (M)*	*Depth (M)*	*Tonnage Factor*	*Material (MT)*
14000	250	2.5	2.25	19687500

The prominent deposits found during the survey in stretch 1 are as follows: -

Figure Showing the type of Mineral deposits

1. Beas Kund Nala Deposit

The mining spot has a volume of river borne material of about 500000 cubic meters with an approximate reserve of about 1200000 metric tons per annum; however, approach to the extraction point is questionable.

Figure Showing the type of Mineral deposits

The deposited material is flood accumulated and causing hindrance to the river flow. This area is also famous as a tourist spot, hence the mining permissions for the extraction depends on the proper measures to keep the tourist spot flourishing. The spatial location of the deposit is latitude 32°19'56.88" N and longitude 77° 8'59.26"E.

2. Sarai Nala Deposit

Sarai Nala Deposit is also a flood deposit like the Palchan Deposit. The approximate volume of the deposit is about 200000 cubic meters with an approximate reserve of 480000 metric tons per annum. There is continuous deposition of boulders every year after the rainy season. The reserve needs to be extracted to maintain the river flow gently. The spatial location of the deposit is latitude 32°18'39.43"N and longitude 77°10'12.63"E.

Figure Showing the type of Mineral deposits

3. Palchang Bridge Deposit

The deposit constitutes accretion of flood-eroded material comprised of boulders, cobbles and pebbles of gneisses and granites in the sandy silty matrix which is deposited every year and causes instability of road and private properties by shifting the river flow. In the vicinity of the deposit, a small Hydro Electric Project is under running condition and is vulnerable to damage by the huge piles of boulders laid down by the river every year. The approximate volume of the deposit is about 150000 cubic meters with an estimated reserve of 360000 metric tons per annum. The spatial location of the deposit is latitude 32°18'28.86" N and longitude 77°10'32.30"E.

Figure Showing the type of Mineral deposits

4. Bhang I and II Deposits

This deposit has two large patches: one near the Nehru Kund Bridge at latitude 32°16'47.07" N and longitude 77°10'47.52"E and the other Near the GREFF office at latitude 32°16'11.41" N and longitude 77°10'51.13"E. The Nehru Kund Bridge deposit has an estimated volume of 700000 cubic meters with an estimated reserve of 1680000 metric tons per annum while Near GREFF Office deposit has an estimated volume of 472500 cubic meters with an estimated reserve of 11340000 metric tons per annum. Both deposits are flood accredited having a sum of variety of boulders, pebbles and cobbles with sandy matrix.

Figure Showing the type of Mineral deposits

Figure Showing the type of Mineral deposits

6.8.2 Stretch 2: One Kilometer upstream and Downstream from Jagatsukh

The area comprising of almost 1 kilometre upstream and downstream from Jagatsukh, this stretch constitutes various braided depositions in the course of the river. The tonnage of material calculated in this stretch is about 1687500MT.

Average Length (M)	*Average Breadth (M)*	*Depth (M)*	*Tonnage Factor*	*Material (MT)*
2000	150	2.5	2.25	1687500

Figure Showing the type of Mineral deposits

The prominent deposits found during the survey in stretch 2 are as follows:-

1. Chori Bihar Deposit

This is a braided deposit formed as a result of little sluggishness in the flow of the river. The deposit is located near the Clath area of Manali block at latitude 32°11'55.82"N, longitude 77°11'18.79"E. In the downstream of this deposit about 0.5 KM there is also a small patch of boulders which is good for extraction in coupling with the main deposit. The main deposit have an estimated volume of 187500 cubic meter with an estimated reserve of 450000 metric tons per annum. The deposit is vulnerable to damage the NH-21 if there is no proper systematic and scientific extraction of material from time to time.

Figure Showing the type of Mineral deposits

6.8.3 Stretch 3: From Haripur to Kullu (25 KM)

This stretch comprised of a length of 25 kilometers from Haripur to Kullu and have an estimated reserve of 35156250 MT. In this stretch the deposition is mainly by the flattening and channeling of the river. Hence proper extraction of the material is needed in these areas to prevent further damage to the local infra-structure.

The prominent deposits found during the survey in stretch 3 are as follows: -

Average Length (M)	*Average Breadth (M)*	*Depth (M)*	*Tonnage Factor*	*Material (MT)*
25000	250	2.5	2.25	35156250

1. Batar Deposit

Batar Deposit mainly constitutes of flood and terrace deposit located near the Tibetan colony at latitude 32.138726 N and longitude 77.157586 E. It has an approximate volume of 525000 cubic meter with an estimated reserve of 1260000 metric tons per annum.

Figure Showing the type of Mineral deposits

2. Patlikulh Deposit

Patlikulh deposit is located near Manali at latitude 32.10440 N and longitude 77.1406164 E and is comprised of two spots, each having an approximate length of 500 meters and an approximate width of 220 meters. The approximate volume of the deposit is about 337500 cubic meters with an approximate reserve of 810000 metric tons per annum.

Figure Showing the type of Mineral deposits

3. Mandalgarh Deposit

The deposit is located at latitude 32.074994 N and longitude 77.129165 E and having two patched one on the right-hand side of river flow and other at the center of the river. Madalgarh deposit is comprised of medium to large boulders with loose sand. This deposit has an approximate volume of 50000 cubic meter with an average reserve 120000 cubic meter per annum.

Figure Showing the type of Mineral deposits

4. Dolu Nala Deposit

This deposit is at the center of the river causing the river to bifurcate leading to toe erosion of the NH-21 at Kataria mile stone. It is mainly constitutes of medium to large sized boulders of various rock types. The deposit comprised of two patches about 500 and 300 meter in length having an approximate volume of 120000 cubic meters with an estimated reserve of 288000 metric tons per annum. The spatial location of the deposit is at latitude and longitude

Figure Showing the type of Mineral deposits

5. Bandrol Deposit

Deposit is located at latitude 32.032023 N and longitude 77.131331 E and comprised of 3 pockets; one in canter, one at RHS and one at LHS of the river flow. Bandrol deposit has an approximate volume of 375000 cubic meters with an average reserve of about 900000 metric tons per annum and is comprised of boulders from small to medium size with loose sand.

Figure Showing the type of Mineral deposits

6.8.4 Stretch 4: From Mohal to Aut (20 KM)

This stretch comprised of a 20-kilometre length from Mohal to Aut. In this stretch, most of the deposits around the Kullu district near the Aut area are found submersed in the water of Largi Dam, however, sand can be extracted after desiltation. The total reserve estimated in this stretch is about 5625000 MT.

Average Length (M)	*Average Breadth (M)*	*Depth (M)*	*Tonnage Factor*	*Material (MT)*
20000	50	2.5	2.25	5625000

The prominent deposits found during the survey in stretch 4 are as follows: -

1. Jia Deposit

The Jia Deposit is discovered near Bhunter on the left bank of the river at latitude 31°54'21.40" N and longitude 77° 9'8.68" E. This deposit has an approximate volume of 5000 cubic meters and an estimated reserve of 12000 metric tons per annum. The main constitution of the deposit is boulders and pebbles. This spot is repeatedly noticed as vulnerable for illegal mining activities, though a good deposit of river bourn material and more estimated reserve can be replenished every year if the banks are protected and check dams are constructed in the appropriate locations at the site.

Figure Showing the type of Mineral deposits

Figure Showing the type of Mineral deposits

2. Bhunter Deposit

The deposit is located on the left side of Bhunter Airport at latitude 31°52'44.98" N and longitude 77° 9'20.84"E, in the middle of river Beas. It is a big pocket of large to medium boulders with sandy and silty matrix. The deposition is causing shifting of the river channel towards the left bank and the consequences are toe erosion on the bank. The approximate volume of deposit is 43750 cubic meters having an approximate reserve of 105000 metric tons per annum.

Figure Showing the type of Mineral deposits

Figure Showing the type of Mineral deposits

3. Jarad Deposit

The deposit is discovered near Bhunter at latitude 31°51'29.66" N and longitude 77° 9'59.91"E, having a volume of 12000 cubic meters and an approximate reserve of 28800 metric tons per annum. There are two pockets of river-borne material located adjacent to each other. The area is private as well as forest land and has an IPH scheme in the vicinity.

6.8.5 Miscellaneous deposits

I. Shat Nala Deposit

Shat Nala Deposit is located near the Shat Village up to the confluence of Nala with the river at latitude 31°58'18.83" N and longitude 77°13'7.92"E. The river-borne material is deposited in small pockets along both banks comprising mainly boulders and pebbles. The approximate volume of the deposit is about 6000 cubic meters having an estimated reserve of 14400 metric tons per annum.

II. Sapagni deposit

The said Deposit is located at latitude 31°45.556 N and longitude 77° 15.501 E on the left side of the river Sainj river and comprised of small to medium bounders with loose sand. It has an approximate volume of 2250 cubic meters with an average reserve of 5400 metric tons. This area is also applied by the lessee for the extraction of minerals.

Figure Showing the type of Mineral deposits

III. Nagni Village deposit

The Nagni village deposit is located at latitude 31°38.455 N and longitude 77°24.252 E and is comprised of cobbles, pebbles and boulders of schist, granite, and gneisses with loose sand. The area is also famous for trout fishing and is approachable from Left Bank District Road. The deposit has an approximate volume of 112500 cubic meters with an average reserve of 270000 metric tons per annum.

IV. Kandugarh Deposit

The Deposit is located at latitude 31.487512 N and longitude 77.412255 E and is mainly comprised of pebbles, and boulders of phyllite, schist and quartzite. On the left bank of the river, a water flour mill is operational. The area can be approached from the left bank. The deposit has an estimated volume of 45000 cubic meters with an average reserve of 108000 metric Ton per annum.

V. Satluj River Deposits:

The River Satluj forms the boundary of Nirmand and Anni Tehsil of Kullu with Kullu District and there are small chunks of deposits comprised of pebbles, and boulders of phyllite, schist and quartzite available in Huge quantities in the River bed area and easily approachable.

7.0 GENERAL PROFILE OF THE DISTRICT

7.1 Introduction

Kullu district lies in the central part of the state and is also characterized by three physiographic units i.e. The Siwaliks or Outer Himalayas, Lesser Himalayas or Mid Mountains and Greater Himalayas. The district stretches from the village of Rampur in the south to the Rohtang Pass in the North. Blessed with an abundance of Natural beauty, the Kullu Valley, Himachal's prized tourist destination, is rightly celebrated as the valley of the Gods. Nestled between the Dhauladhar and Pir Panjal ranges, it is the cradle of the great River Beas. About 80km long, this lush valley extends from the gorge at Aut to the Rohtang Pass.

The lower portion of the Beas, Sutlej, Sainj and Tirthan rivers belong to the Siwalik range where the elevation is less than 1500 meters above MSL. The eastern part of the district basically the upper part of Great Himalayan National Park, Kheerganga National Park and Inderkila National Park where the elevation is above 4500 meters belongs to the Greater Himalayas characterized by fluvial-glacier landscape, thin vegetation and low density of human population. In between the Greater Himalayas and Siwaliks, the maximum portion of the district belongs to the Lesser Himalayas and is characterized by high altitude (1500–4500 meters above MSL) broad leaf conifer forest, alpine meadow and land under horticulture.

There are several references of Kullu in the Ramayana & Mahabharata, Vishnu Purana & other Sanskrit literature. But it is believed that Manu after the great deluge, first stepped into the earth from the celestial boat at a place on this land. The particular spot where he established his abode was the present Manali (village), which is regarded as the changed name of 'MANU-ALAYA', which is the home of Manu.

Administrative Map of District Kullu

The Kullu is a mountainous terrain with cliffs and valleys. The name of the Kullu district was designated after the word "Kulut" which was described in the list of second-century coins. Kullu was probably the most ancient state next to Kashmir and Kangra. Like other hill states, Kullu had its ups and downs till it was ceded to the British in 1846 according to the Lahore agreement, along with other trans-Sutluj states. Kullu was also declared a district in 1963 and was a part of Punjab up to October 1966.

Before independence, the Kullu area was one tehsil of district Kangra. In 1963 the district came into existence. Lahaul-Spiti was attached to Kullu for administration. On 1st November 1966, on the reorganization of states, Kullu became a District of Himachal Pradesh.

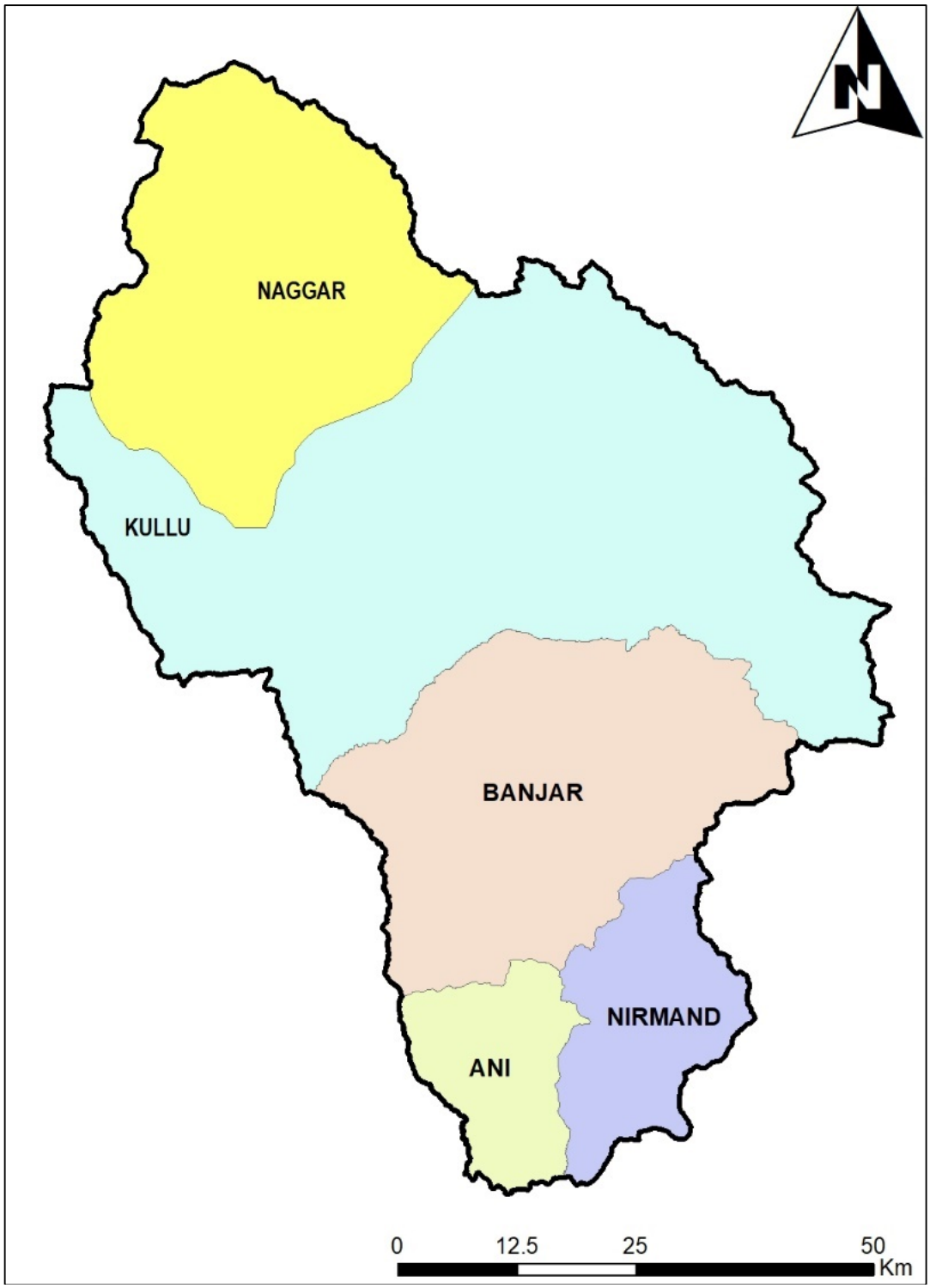
The district is surrounded by the Lahaul Spiti in the Northeast in South Kinnour and Shimla and South West Mandi district. It is situated on both sides of the Beas River $31^{o}58'.00$ Latitude and 77^{o} 06'.09 longitude. As per the surveyor General repost, the total Geographical area of the district is 5503 sqm which is 9.9 percent of the total geographical area of the state. The district headquarters is situated at an altitude of 1200 m from the mean sea level. The district has four sub-divisions and six tehsils and sub-tehsil.

The Beas and Satluj are the main rivers of the district. River Beas originates from 'Beas Kund', a small Spring near Rohtang Pass at elevation ± 4085m, which forms the world-famous valley of Kullu, rises from the Pir Panjar Ranges and flows southwards for about 12m Kms. Unlike other major rivers of northern India, this river is not fed by any natural lake. The river passes through the famous valley of Manali and Kullu which is known for its scenic beauty and grandeur of Himalayan ranges. High peaks of the catchment remain covered with snow for about nine months in a year but this area is negligible compared with the total catchment area. Most catchment area comprises precipitous slopes and peaks are mainly bare. It leaves Kullu at a place called Bajaura. Sarwari and Parvati are its main tributaries. The river Beas and its tributaries have the lowest level during the winter months of December, January and February and the highest level during June, July and August. Occasionally the floods also occur in Kullu and August. The Satluj River on the southern side of the district rises from Mansarovar in Tibet and touches the district in Nirmand Tehsil opposite Rampur Tehsil of Shimla District.

7.2 SALIENT FEATURES OF KULLU DISTRICT

Location

State	Himachal Pradesh
District	Kullu
Year of creation of District	1963
Total Area	5503 Sq. Kms.
Total Assembly Constituency	4 - Manali, Kullu, Banjar, Anni
Major Rivers	Beas, Satluj, Parvati



Administrative Boundaries of Distt. Kullu

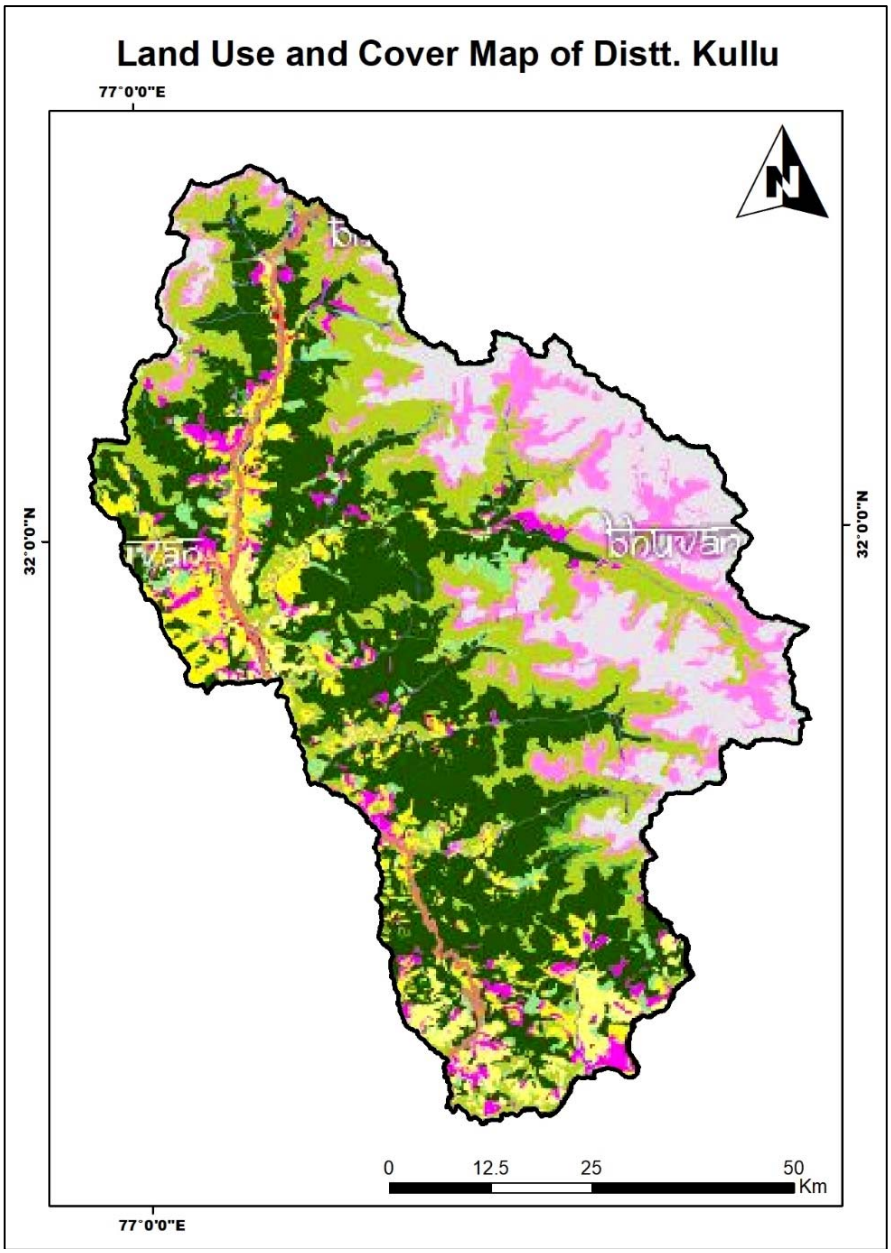
Population (2011 census)

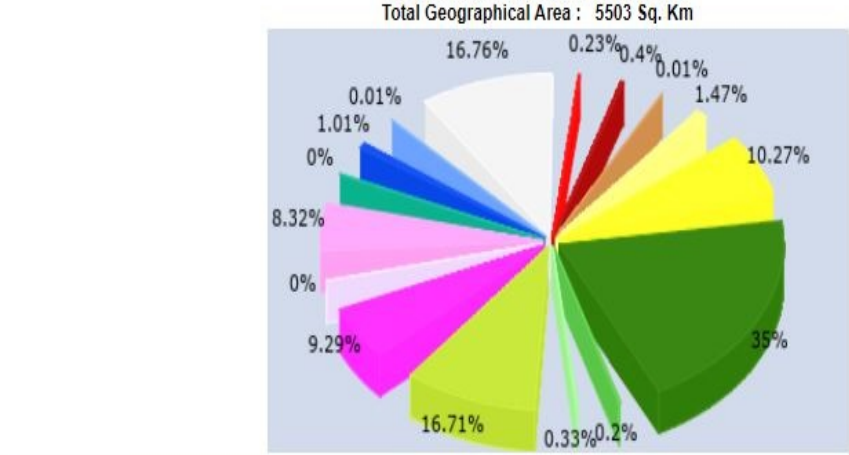
Total		437,903
Rural		396,512
Urban		41,391
Sex Ratio	942	
Scheduled Cast		122,659
Scheduled Tribe		16,822

Administrative Units	
Sub Divisions	4
Tehsils	6
Sub-Tehsils	2
Blocks	5
Towns	5
Total Villages	326
Total Police Stations/Posts	13
Families	
Total Families	76902
Rural Families	69483
Urban Families	7419
Literacy (2011 Census)	
Total	79.40
Male	87.39
Female	70.91
Panchayati Raj	
Total Panchayats	204
Backward Panchayats	71
Zila Parishad Members	103
Panchayat Samiti Members	1228
Gram Panchayat Members	63
Total Panchayat Secretaries	120
Total Panchayat Sahyaks	63
Total Technical Assistants	--
Agriculture	
Total Agricultural Land (Hect.)	65186
Net Shown Area (Hect.)	36342
Irrigated Area (Hect.)	2878
Industries	
Large & Medium Scale Units	2
Small Scale Units	1962
Industrial Area	1
Education	
Anganwaris	376
Primary Schools	727
Middle Schools	107
High Schools	49
Senior Secondary Schools	31
Colleges	2
I.T.I.'s	1
Health	
C.H.C.	7
P.H.C.	17
Sub-Centres	99
Hospitals	2
Ayurvedic Health Centres	65
Banks	
Co-operative Banks	19
Commercial Banks	37
Gramin Banks	14
Land Dev. Banks	2

8. Land Utilization Pattern in the district: Forest, Agriculture, Horticulture, Mining, etc.;

The district is comprised of many fertile valleys as well as high-elevation areas. The cultivation is possible in small terraces of holdings in the high hills and the stream/khad basins in most parts of the district. In the valleys, the cultivation is spread over a vast area. The cultivation of crops is confined mostly to flat valley areas while orchards cover the upper slopes of the valleys and river basins. Except for the valley area and stream/khad basins most of the land is either under shrub forests or grassy land with Chil trees up to the height of 1,500 meters from the mean sea level and Kail, Deodar, Spruce, and Poplar on the higher altitudes. It is only in the valleys that the land is mostly flat and fertile and the cultivation of cereals is done. Settlement operations in the district were carried out at different times. Prior to land reforms, most of the holdings were in the hands of landlords who had leased out the same to the tenants on payment of rent in kind or cash. With the framing of tenancy laws, landlordism has almost been abolished and after the implementation of the Himachal Pradesh Tenancy and Land reforms Act, most of the cultivators have become the owners of the land held by them on tenancy except in the case of minors, widows, disabled and service personnel. Before the introduction of Land Reform Laws, the tenants in addition to paying different types of rents also used to render services to the land-lords. With the introduction of land reform laws the tenants have been relieved of the miserable plight to a greater extent and there has been a marked change in their social and economic status.


Land Use and Cover Map of Distt. Kullu
77°0'0"E
32°0'0"N
0
12.5
25
50
Km



LULC Class		Area (Sq.Km)	LULC Class		Area (Sq.Km)
	Builtup,Urban	12.39		Builtup,Rural	22.08
	Builtup,Mining	0.31		Agriculture,Crop land	80.74
	Agriculture,Plantation	565.39		Forest,Evergreen/ Semi evergreen	1925.78
	Forest,Deciduous	10.87		Forest,Scrub Forest	18.32
	Grass/Grazing	919.28		Barren/unculturable/ Wastelands, Scrub land	511.4
	Barren/unculturable/ Wastelands, Sandy area	0.07		Barren/unculturable/ Wastelands, Barren rocky	458.01
	Wetlands/Water Bodies, Inland Wetland	0.09		Wetlands/Water Bodies, River/Stream/canals	55.49
	Wetlands/Water Bodies, Reservoir/Lakes/Ponds	0.55		Snow and Glacier	922.24

8.1 Agriculture

The economy of the district is basically agrarian. It largely depends on agriculture, fruit farming, and animal husbandry. Edaphic conditions in the district vary considerably. The average rainfall also varies in the valley as well as on the high altitude. The texture of the soil is generally sandy loam to clay loam. The salubrious agro-climatic conditions provide a range of potentialities for growing cash crops like off-season vegetables, seed potatoes, pulses, and temperate fruits apart from cereals, millets and oilseeds. The low lying fertile valleys where irrigation facilities are available, cultivation of off-season vegetables has emerged as an attractive source of income for the farming community.

As the cereal crops viz., maize, wheat, barley and pulses are generally the domain of unirrigated land, hence, no significant shift in the proportion of acreage under these crops has taken place over the period. However in case of paddy, 80 per cent of which is grown under irrigated conditions, a significant proportion of the area has been shifted to vegetables. A sharp decline in the area under food grains signifies the extent of commercialisation of agriculture in the district in recent years. The total cropped area as well as the area under food grains registered a declining trend at state level too.

The district has different types of soil and agro-climate conditions which are quite suitable for the growth of various types of cereals, off-season vegetables, temperate and stone fruits and other cash crops. The major crops grown in the district are wheat and Paddy, Maize barley millet, besides these, potato and a variety of vegetables like green peas, cauliflower, cabbage, spinach tomatoes, etc. are also grown in the district. The adjoining village to the lease area is Patrisghat. The main crop of these villages is wheat and maize. Potato and cabbage are also grown in some parts of the village, as discussed in para 3.1. The lease area consists of hard rock covered with thin soil cover. As the such

area is not suitable for agriculture. The source of water and irrigation in District Kullu can be classified into five categories:

1. Lift irrigation scheme
2. Kuhls,
3. Well used for domestic purposes,
4. Tube wells,
5. Well used for irrigation.

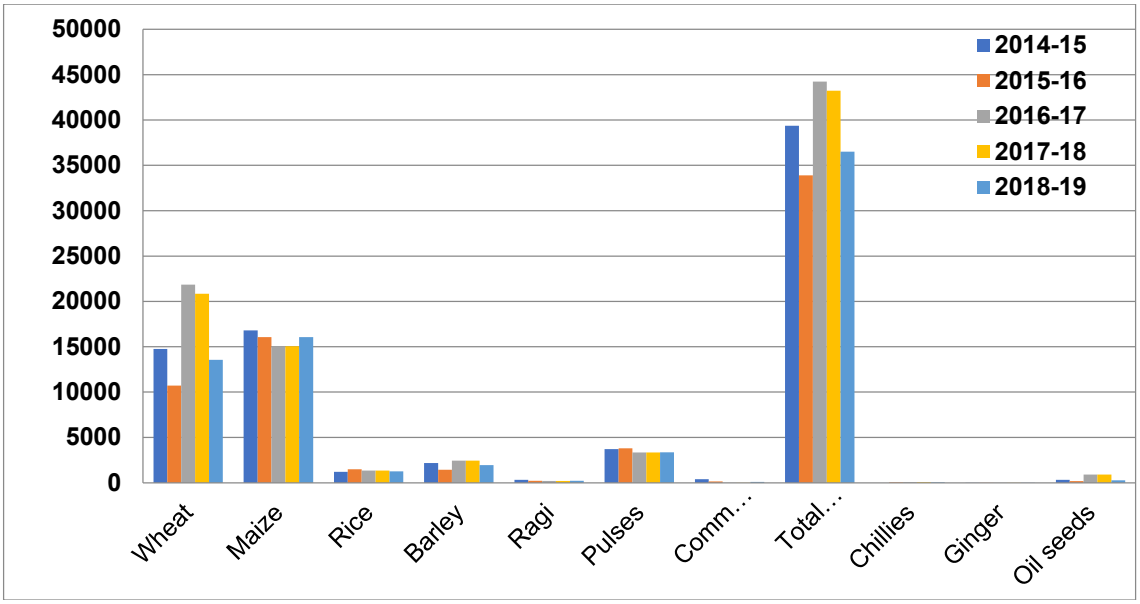
Major food crops are grouped into three categories:

1. Cereals,
2. Pulses,
3. Other food crops like Chilies, Ginger, Sugarcane and Turmeric.

Table showing area under different crops in hectares at Kullu district

Table showing Area under Different Crops (in Hectares) in Kullu District											
Year	Wheat	Maize	Rice	Barley	Ragi	Pulses	Common millets	Total Food grains	Chillies	Ginger	Oil seeds
2014-15	14762	16795	1203	2168	332	3724	390	39374	...	1	331
2015-16	10727	16058	1490	1445	219	3802	143	33884	72	1	189
2016-17	21846	15061	1344	2432	197	3334	14	44228	79	2	909
2017-18	20846	15061	1344	2432	197	3334	14	43228	79	2	909
2018-19	13567	16058	1258	1957	219	3344	103	36506	64	1	257

Source: Directorate of Land Records, HP

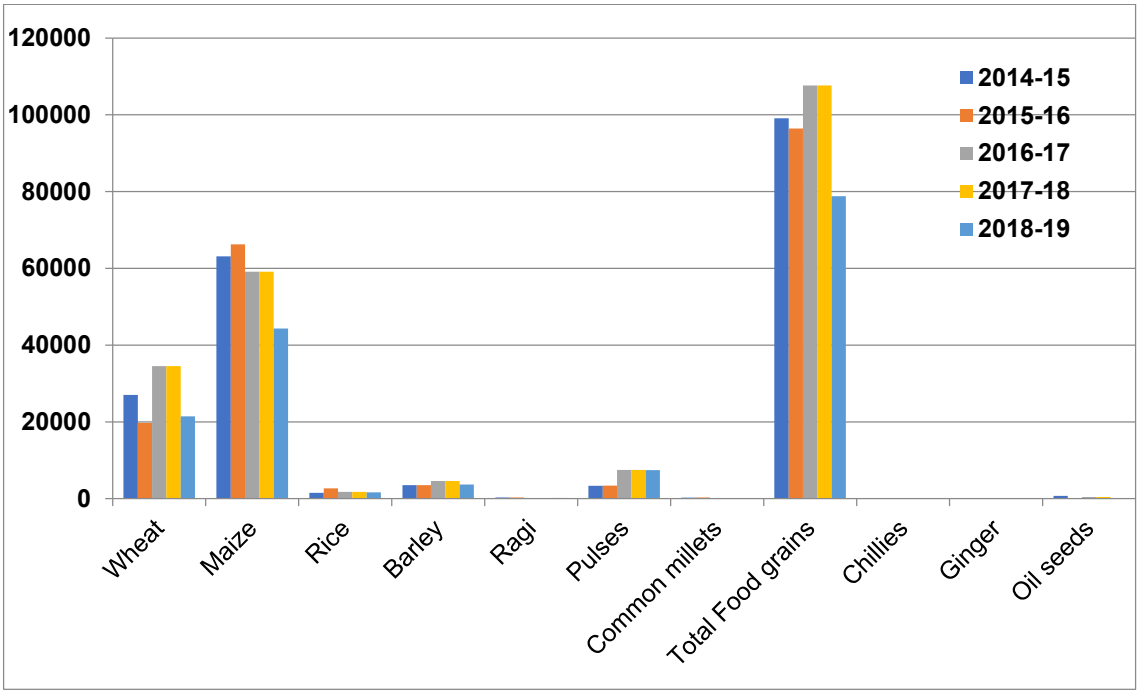


Graph showing area under different crops in hectares at Kullu district

Table showing the production of different crops in MT at Kullu district

Table showing Production of Different Crops (in MT) in Kullu District											
Year	Wheat	Maize	Rice	Barley	Ragi	Pulses	Common millets	Total Foodgrains	Chillies	Ginger	Oil seeds
2014-15	27017	63112	1509	3523	310	3339	275	99085	...	3	717
2015-16	19705	66253	2682	3523	310	3389	278	96410	38	2	118
2016-17	34544	59115	1758	4581	159	7458	14	107629	33	2	429
2017-18	34544	59115	1758	4581	159	7458	14	107629	33	2	429
2018-19	21436	44321	1648	3679	195	7428	102	78809	26	4	140

Source: Directorate of Land Records, HP

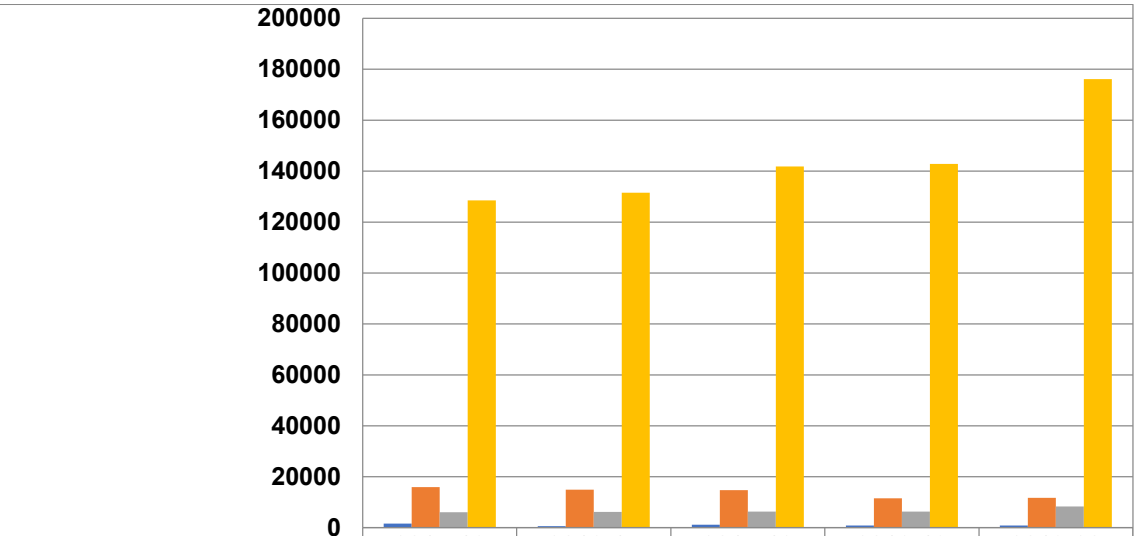


Graph showing the production of different crops in MT at Kullu district

Table showing the area in hectares & production of vegetables in tonnes

Area & Production of Vegetables (Distt Kullu)				
Year	Potato		Other Vegetables	
	Area (In Hectares)	Production (In Tonnes)	Area (In Hectares)	Production (In Tonnes)
2015-16	1600	15950	6046	128471
2016-17	600	14950	6180	131508
2017-18	1175	14700	6337	141854
2018-19	900	11520	6337	142842
2019-20	900	11700	8332	176126

Source: Directorate of Land Records, HP



	2015-16	2016-17	2017-18	2018-19	2019-20
Potato Area (In Hectares)	1600	600	1175	900	900
Potato Production (In Tonnes)	15950	14950	14700	11520	11700
Other Vegetables Area (In Hectares)	6046	6180	6337	6337	8332
Other Vegetables Production (In Tonnes)	128471	131508	141854	142842	176126

Graph showing the area in hectares & production of vegetables in tonnes

8.2 Horticulture

Horticulture is the mainstay of the economy of the district. It occupies about 23,746 hectares of area. Apple is the major fruit crop accounting for nearly 83 per cent of the total area under fruits. Stone fruits (like peach, plum & apricot), pomegranate, pear and kiwi are the other fruits grown in the district. The total production of fruits in the district was reported to be 3,13,906 tonnes. Root rot, root borer, canker, faulty training pruning, improper ratio of pollinizers are the major problems associated with fruit crops. Plantation of new/improved crops/ varieties, maintenance of proper pollinizer ratio in the orchards, use of bees for better pollination, following recommended spray schedule, proper training pruning and scientific management are the suggested measures to boost the horticultural production. Horticulture department is working for the upliftment of the orchardists through 15 schemes being run by it focussing mainly on the promotion and production of fruits, floriculture, aromatic and medicinal plants, protected cultivation, vermicompost, mushroom cultivation, processing, beekeeping and micro irrigation schemes.

The main horticulture produce of the area can be classified into the following five categories:

1. Apple
2. Other temperate fruits.
3. Sub-tropical fruits
4. Nuts and dry fruits
5. Citrus fruits.

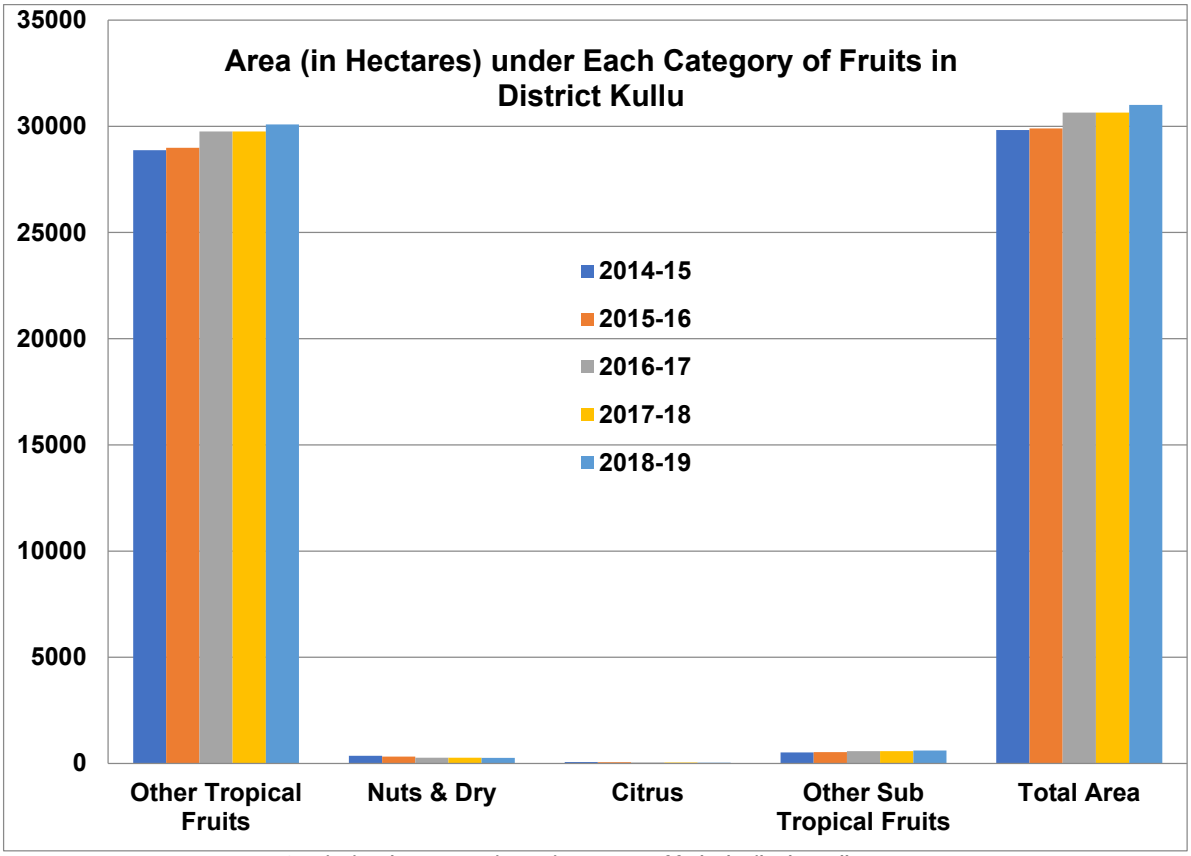
However, in the area under question, there is no scope for any Horticulture activities as the area is not suitable to grow the fruit plant.

Table showing area under each category of fruits in district Kullu

Table showing Area (In Hectares) under Each Category of Fruits in District Kullu					
Year	Other Tropical Fruits	Nuts & Dry	Citrus	Other Sub Tropical Fruits	Total Area

2014-15	28878	358	65	522	29823
2015-16	28989	322	56	536	29903
2016-17	29757	273	45	573	30648
2017-18	29757	273	45	573	30648
2018-19	30095	266	41	602	31004

Source: Directorate of Horticulture, HP

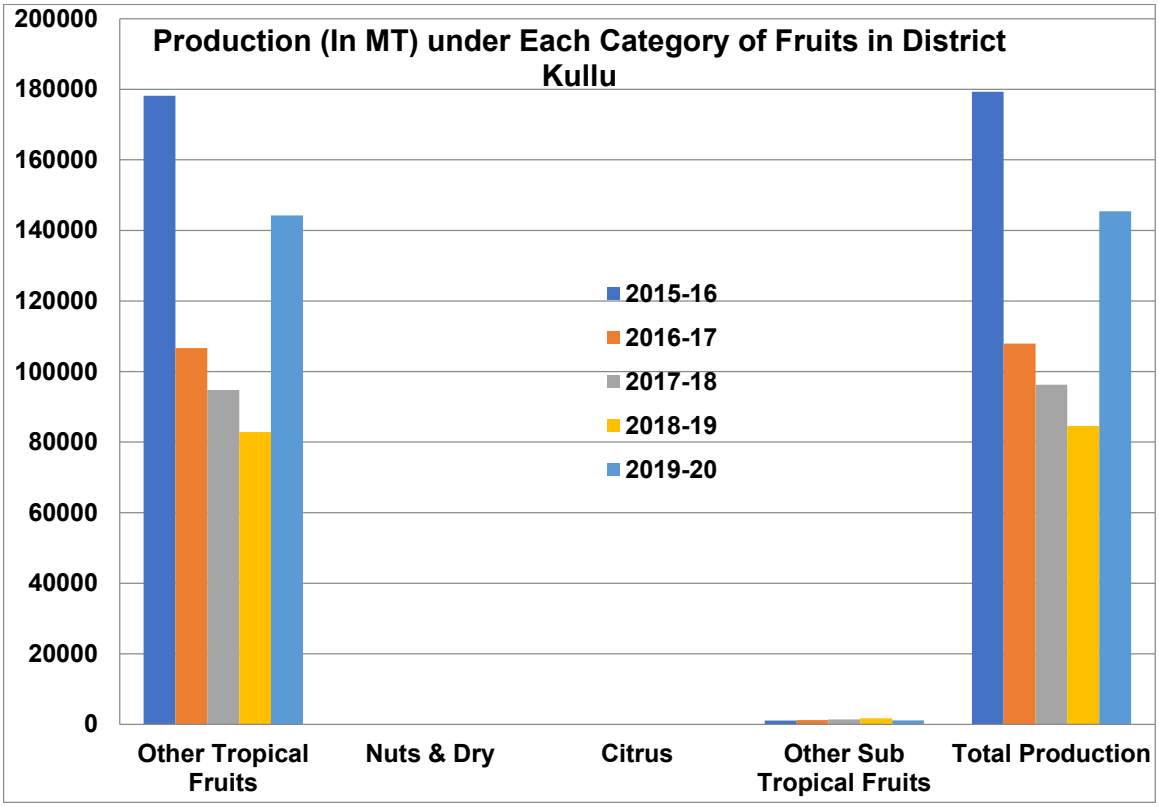


Graph showing area under each category of fruits in district Kullu

Table showing production under each category of fruits in district Kullu

Table showing Production (In MT) under Each Category of Fruits in District Kullu					
Year	Other Tropical Fruits	Nuts & Dry	Citrus	Other Sub Tropical Fruits	Total Production
2015-16	178178	46	10	1062	179296
2016-17	106653	54	8	1223	107938
2017-18	94787	67	9	1403	96266
2018-19	82847	33	13	1709	84602
2019-20	144218	35	17	1138	145408

Source: Directorate of Horticulture, HP



Graph showing production under each category of fruits in district Kullu

8.3 Animal Husbandry

Animal husbandry is a supplementary source of livelihood for a large chunk of the population in the district. It also serves as a source of FYM to agriculture. In fact, agriculture and animal husbandry are complementary enterprises; both are interdependent and provide support to each other. Various schemes for feed & fodder development, milk production, genetic upgradation of cattle and animal health improvement are being implemented by the Department of Animal Husbandry in the District. The details of the livestock in the district is as under:

I. Cow
II. Ox
III. Buffalo
IV. Sheep
V Goat
VI. Ponies

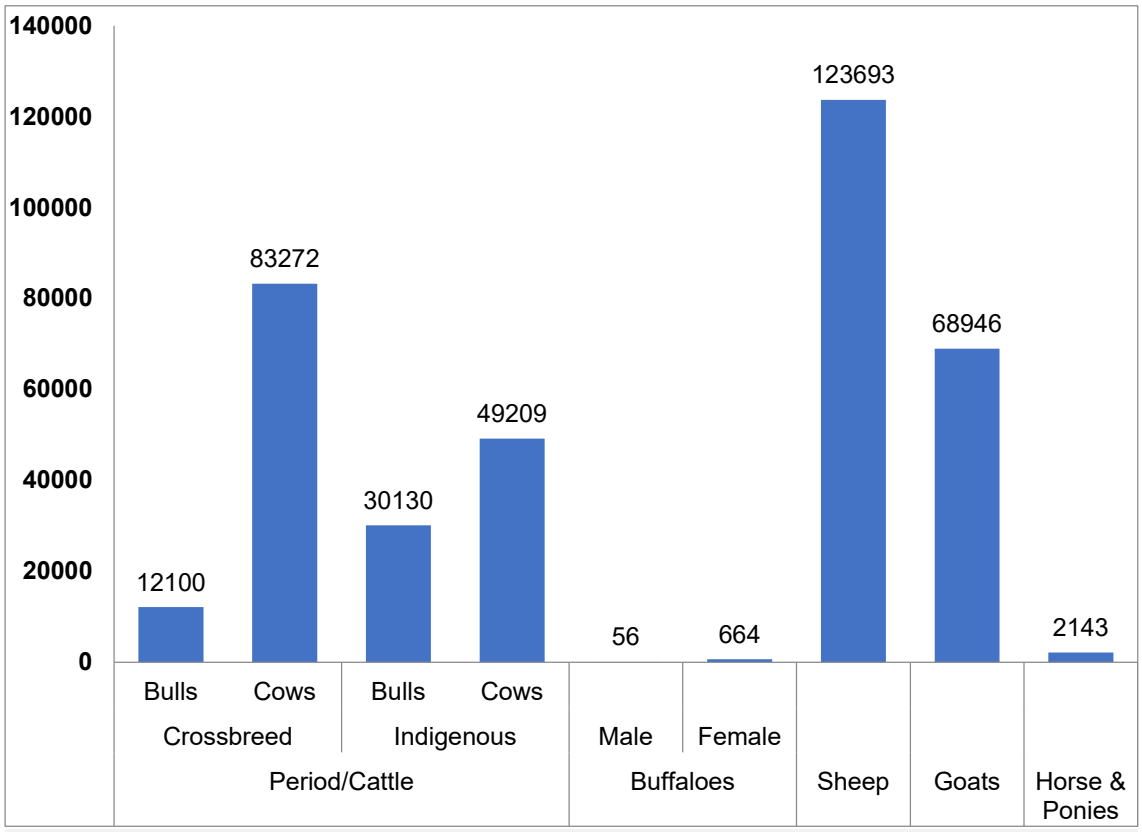
The following are important poultry bids:

I. Fowl
II. Ducks (Rare)

Table showing Livestock Census in district Kullu

Animal Husbandry Population in District Kullu										
Year	Status	Period/Cattle				Buffaloes		Sheep	Goats	Horse & Ponies
		Crossbreed		Indigenous		Male	Female			
		Bulls	Cows	Bulls	Cows					
2012	At Kullu	12100	83272	30130	49209	56	664	123693	68946	2143

Source: Directorate of Animal Husbandry, HP

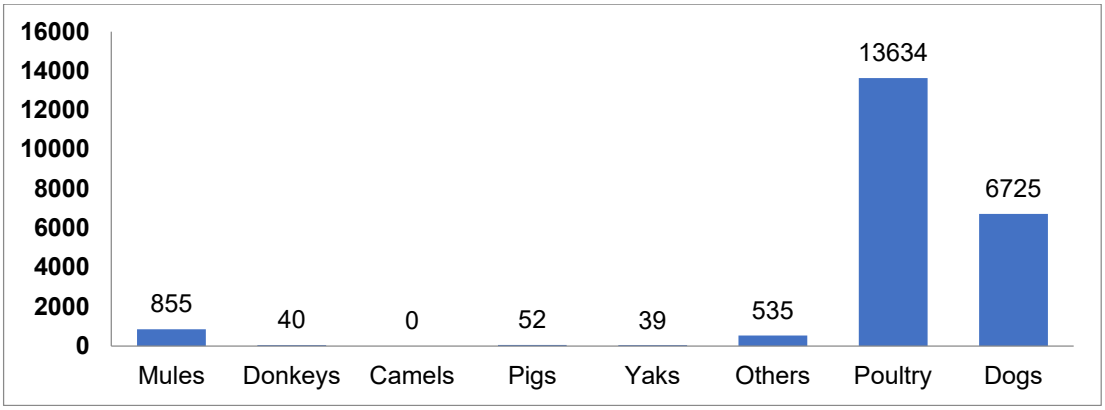


Graph showing livestock census of district Kullu

Table showing other Livestock Census in district Kullu

Other Livestock							
Mules	Donkeys	Camels	Pigs	Yaks	Others	Poultry	Dogs
855	40	…	52	39	535	13634	6725

Source: Directorate of Animal Husbandry, HP



Graph showing other livestock censuses of district Kullu

8.4 Fisheries

The Kullu District is blessed with vast and variegated fisheries resources in the vast network of perennial rivers, streams, Khads and fast-flowing cold waters, harboring a wide variety of tropical species of fish. There is great potential for fish production in the district. The river system in the district constitutes river

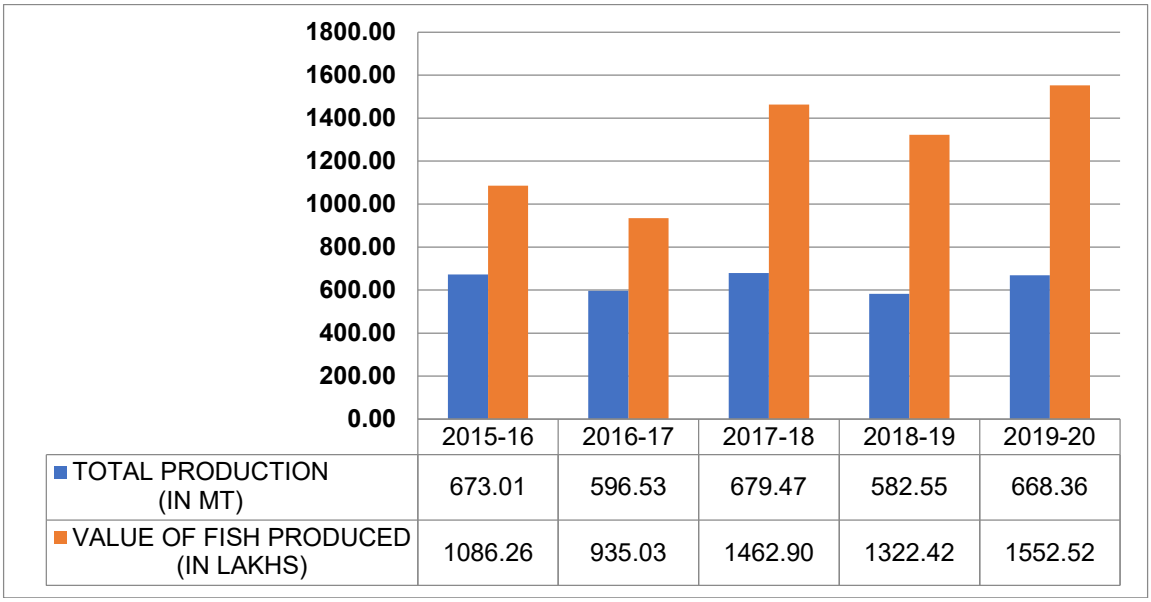
Beas and its tributaries, Uhl, Tirthan, Parvati etc. The total length for fishing in these waters in the district is around 462 Kilometres. These waters are inhabited by a variety of fish namely, SchyzpthoraxTorpilitora, Salmo trueta, salmogairdineri and weedy fishes. Fishing in this water is regulated by fisheries legislation under the Himachal Pradesh Fisheries Act, 1976. As the site under question forms part of mountainous terrain there is no potential for fisheries. The fishery is not fully developed in the surrounding area also and individual fishing is practised to catch fish during the lean season. Low water temperature compels the fisheries to operate their net for a very short period. The inaccessible terrain is also one of the reasons for the lack of fisheries development in the region. Sizothorase Richardson and silver carp are the species observed in the region. High construction cost of raceways, costly seed & feed, lack of technical know-how and nonavailability of farm equipment and chemicals were reported to be the major constraints for the farmers to venture into this enterprise. Technical guidance, financial assistance and provision of farm equipment, chemicals, feed and seed locally at reasonable prices can render a boost to this sector.

The annual production is given in the Table below:

Table showing annual production of Fisheries and its value of catch in district

Table showing Annual Production of Fisheries at District Kullu		
YEAR WISE	TOTAL PRODUCTION (IN MT)	VALUE OF FISH PRODUCED (IN LAKHS)
2015-16	673.01	1086.26
2016-17	596.53	935.03
2017-18	679.47	1462.90
2018-19	582.55	1322.42
2019-20	668.36	1552.52

Source: Fisheries Department, HP



Graph showing annual production of Fisheries and its value of catch in district

8.4 Forest

According to the forest department, the total area under forests in the district is 4,95,169 hectares. The entire area is divided into six forest circles, namely, Kullu, Parvati, Banjar, Ani, Wild Animals and National Park, each having 19.5, 31, 5.29, 10.8, 9.69 and 23.72 per cent of the total forest area, respectively. Again, the forest area has been classified under three categories i.e. reserved forests, protected forests and unclassified forests. Reserve forests occupy 3.24 per cent of the area whereas protected forests occupy 64.8 per cent of the total area. Large-scale felling of trees, forest fires, theft, and overgrazing are the major factors resulting in the destruction and degradation of forests.

The total value of medicinal herbs, resins and other forest products during 2002-03 amounted to Rs. 61 lakh.

The forest cover is visible along hill slopes, along river terraces scattered in patches or in strips on the banks of the streams as well as river banks on gravely and sandy loam soil. The Himalayan sub-tropical pine forests are observed between elevations 1000-2000 meters. Overlapping the tropical dry mixed deciduous forest at a lower elevation and giving way to temperate forests at a higher elevation. The Ban and Oak are the common and major species over the considerable area which varies from 1500 to 2100 meters. It thus overlaps the altitudinal zones of all the lower conifers and is commonly found in association with blue pine, Deodar, Ban, Oak, Forests occur at high elevations. The main associates are Rhododendron arboreuni, Lyonia, avalifolia and litseaumbora etc.

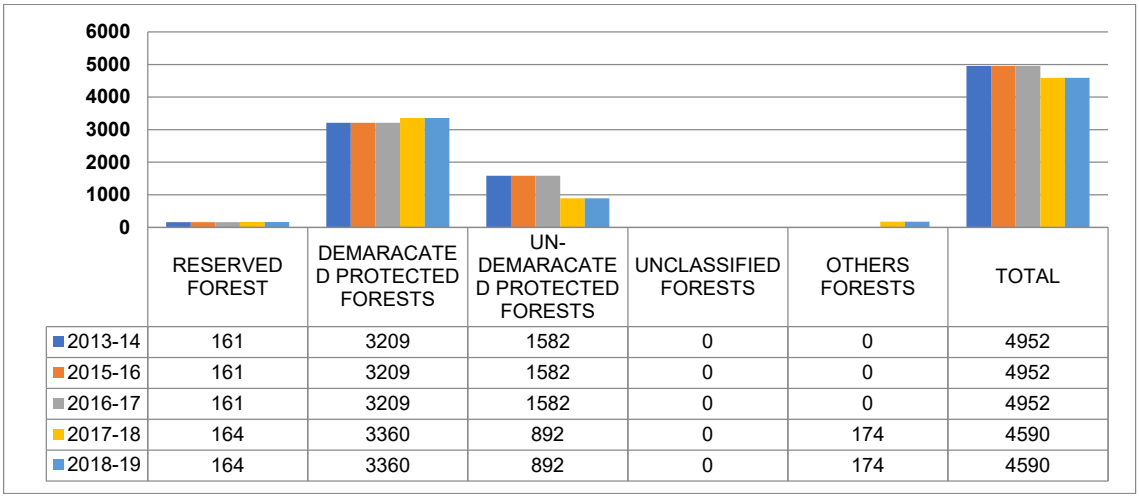
The following trees shrubs and grasses are found in the district:

Sr. No.	Local Name	Sr. No.	Local Name
1	Tosh	14	Chil
2	Khair	15	Kail
3	Karyal	16	Chuli
4	Neem	17	Bashunti
5	Diar	18	Kashjmal
6	Galgal	19	Bharg
7	Nimbu	20	Kathi
8	Safeda	21	Timmer
9	Pipal	22	Tur
10	Akhrot	23	Akash bel
11	Amb	24	Baker bel
12	Kaphal	25	Pani bel
13	Rai	26	Dub

Table showing the classification of forest area (in sq.km.) of district

Classification of Forest Area (in sq km) of Kullu District						
YEAR	RESERVED FOREST	DEMARCATED PROTECTED FORESTS	UN-DEMARCATED PROTECTED FORESTS	UN-CLASSIFIED FORESTS	OTHERS FORESTS	TOTAL
2013-14	161	3209	1582	…	…	4952
2015-16	161	3209	1582	…	…	4952
2016-17	161	3209	1582	…	…	4952
2017-18	164	3360	892	…	174	4590
2018-19	164	3360	892	…	174	4590

Source: Forest Department, HP



	RESERVED FOREST	DEMARACATED PROTECTED FORESTS	UN-DEMARACATED PROTECTED FORESTS	UNCLASSIFIED FORESTS	OTHERS FORESTS	TOTAL
2013-14	161	3209	1582	0	0	4952
2015-16	161	3209	1582	0	0	4952
2016-17	161	3209	1582	0	0	4952
2017-18	164	3360	892	0	174	4590
2018-19	164	3360	892	0	174	4590

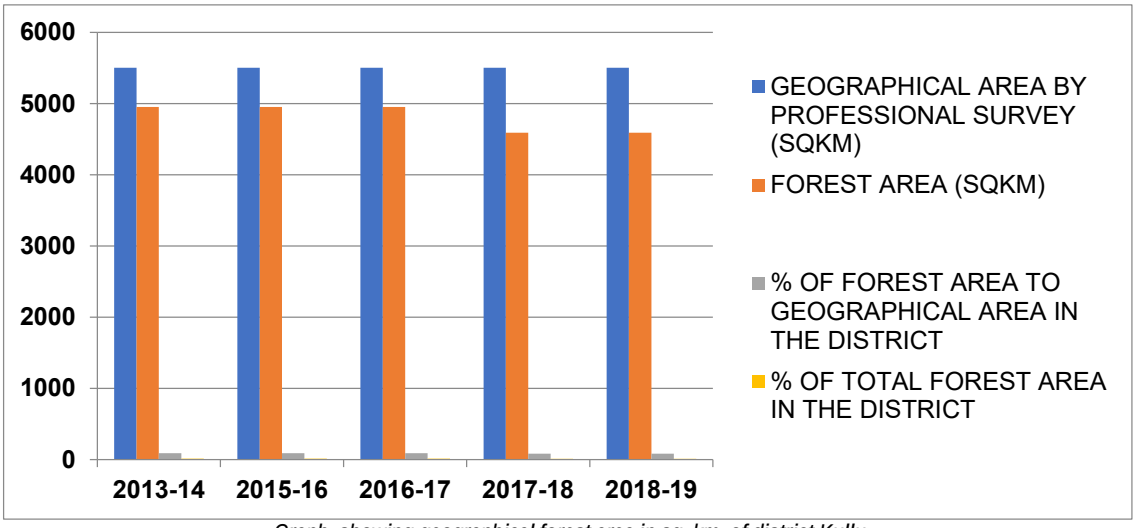
Graph showing the classification of forest area in sq. km. of district Kullu

Table showing forest area (in sq.km.) of district

Forest Area of Kullu District

YEAR	GEOGRAPHICAL AREA BY PROFESSIONAL SURVEY (SQKM)	FOREST AREA (SQKM)	% OF FOREST AREA TO GEOGRAPHICAL AREA IN THE DISTRICT	% OF TOTAL FOREST AREA IN THE DISTRICT
2013-14	5503	4952	89.9	13.4
2015-16	5503	4952	89.9	13.4
2016-17	5503	4952	89.9	13.4
2017-18	5503	4590	83.41	12.1
2018-19	5503	4590	83.41	12.1

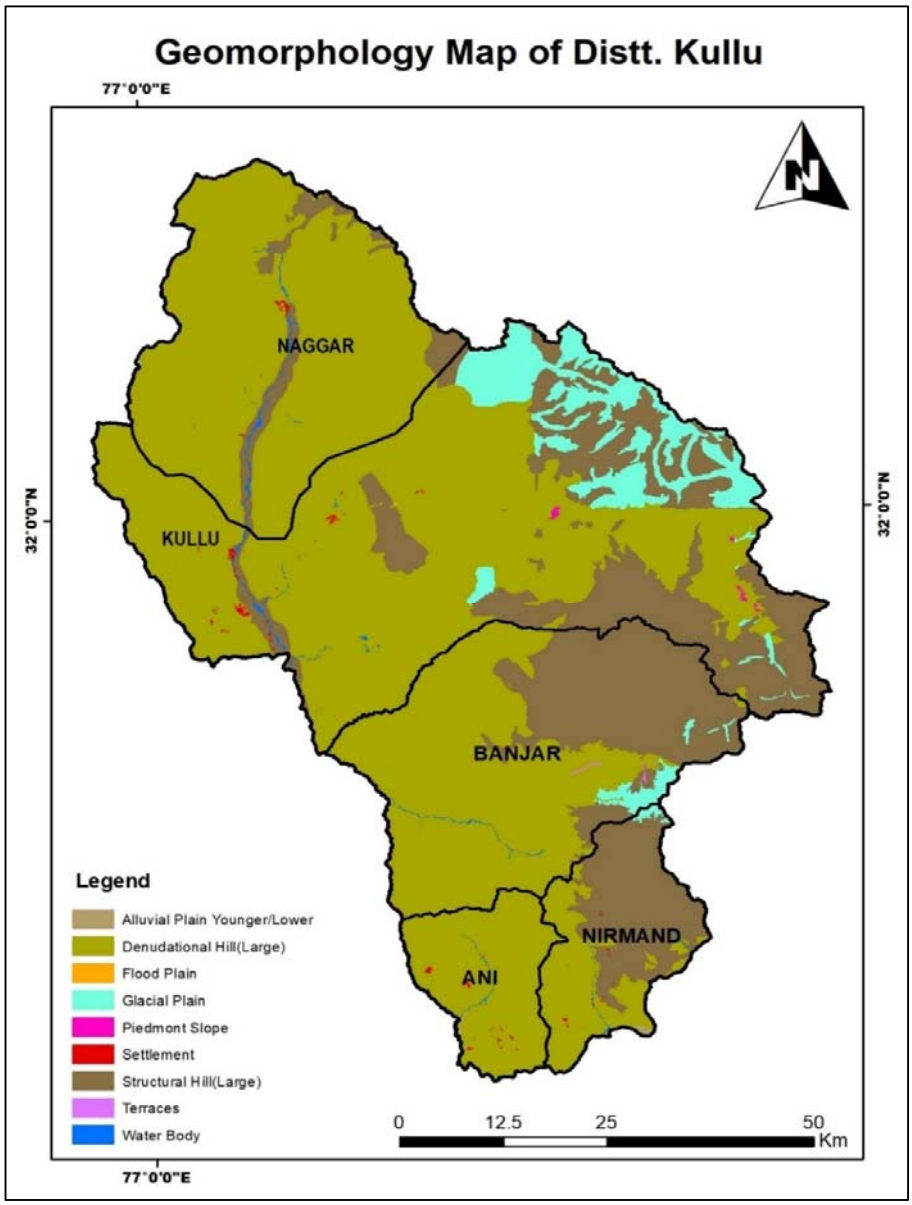
Source: Forest Department, HP

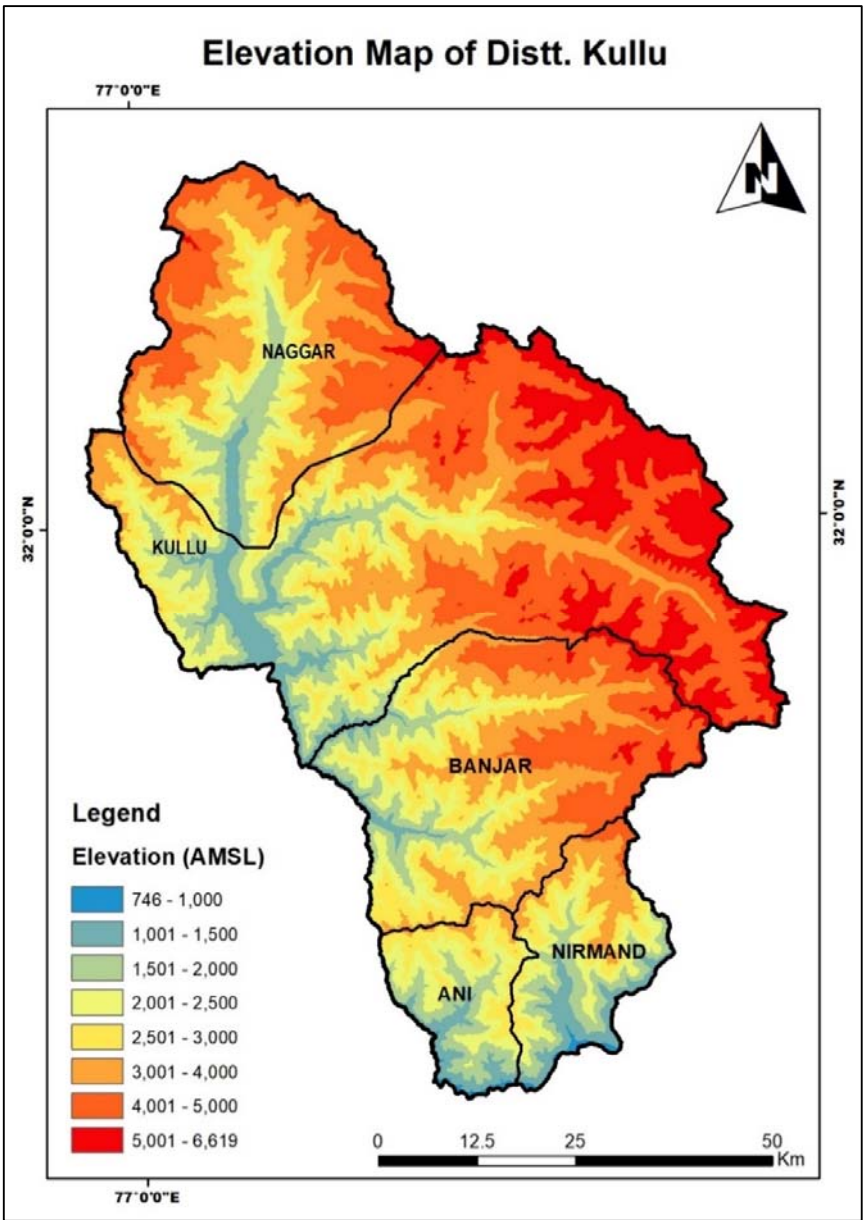


Graph showing geographical forest area in sq. km. of district Kullu

9. PHYSIOGRAPHY OF THE DISTRICT

Kullu district situated in the lesser Himalayas between 31º20' - 32º26' north latitudes and 76º59' - 77º50' east longitudes possesses an intricate system of mountain ranges that are the result of successive compression movements of the earth's crust. The district is bounded by the Pir-Panjal range in the north; Bara Bhangal in the northwest; the Greater Himalayas in the eastern boundary and the Dhauladhar range in the southwest while River Satluj marks the southern boundary of the district The district has very high absolute relief ranging from 750-6200 meters. The geomorphological character of Kullu is influenced by both glacial and fluvial processes; the area is broadly divided into glaciers & permanent snow fields, rocky/barren slopes, valley slopes & ridges, and main valley floor. The glaciers & permanent snowfields are found in most of the eastern parts above an elevation of 4500 meters. The barren/rocky surfaces occupy the lower parts of glaciers and permanent snow fields while valley slopes occupy a large part in the district and consist of steep to moderately steep slopes, ridges and narrow valleys where slopes usually have an inclination of 30-40 degrees. The main valley floor of River Beas is dominated by outwash fans, alluvial fans and river terraces.





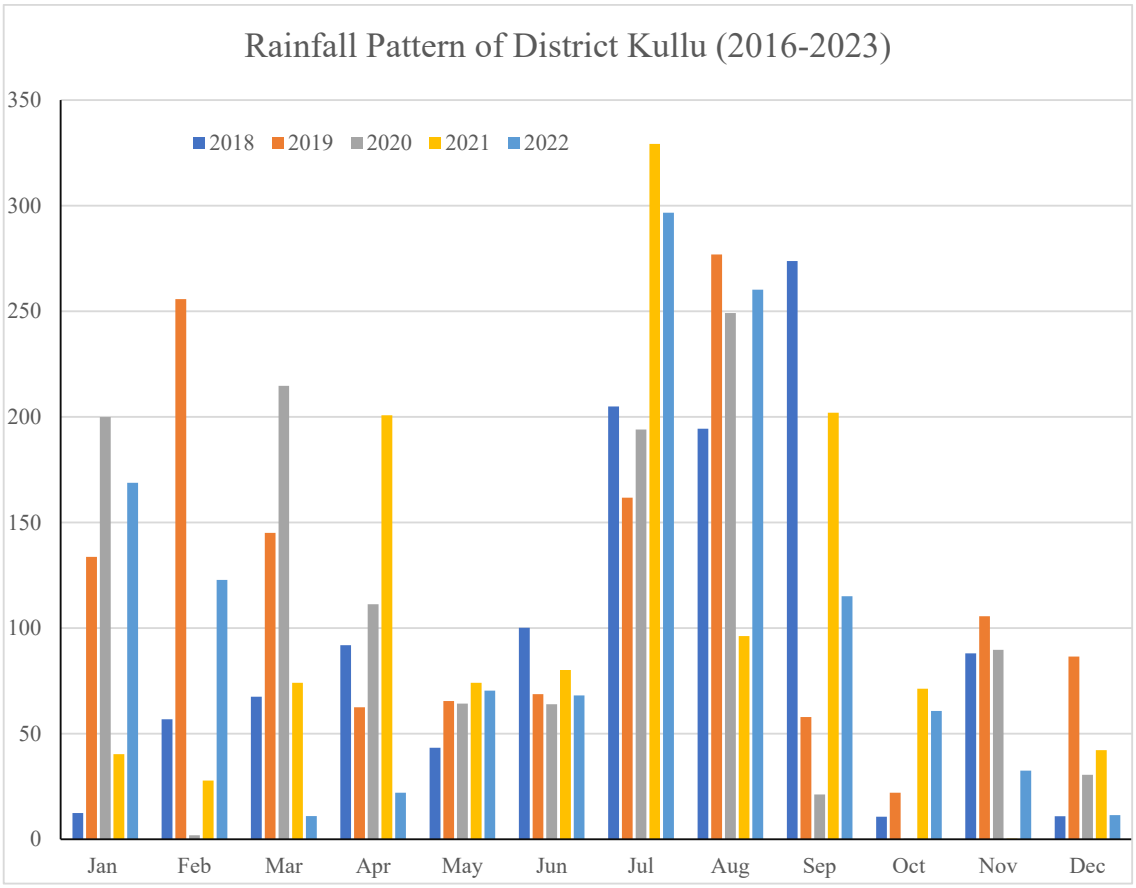
10. RAINFALL

The topography of Kullu, characterized by its valleys and mountains, can influence the distribution of rainfall within the district. The southern and western parts of Kullu, closer to the main Himalayan range, might receive more precipitation compared to the northern areas. It's important to note that the climate and rainfall trends can vary from year to year due to factors such as the Indian Ocean Dipole, El Niño, or La Niña events, which impact the monsoon patterns. The district receives moderate rainfall and the bulk of it is generally received during June to September and January-February. During the monsoon months, Kullu witnesses moderate to heavy rainfall, transforming the landscape into a lush green paradise. August is the wettest month throughout the district. The average annual rainfall of the district is 1405.7 mm, out of which 57% occurs from June to September.

The monsoon season, which typically occurs from June to September, brings the majority of the annual precipitation to the region. The rainfall is vital for sustaining the rich biodiversity and supporting agricultural activities in the region. The moisture-laden winds from the Bay of Bengal bring abundant rainfall to the Himalayan foothills, contributing to the fertility of the soil and facilitating the

cultivation of various crops, including apples, plums, and other fruits for which the region is renowned. The average monthly rainfall in the Kullu district during the years 2018 to 2022 is as follows.

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	12.4	56.8	67.5	91.9	43.3	100.1	204.9	194.4	273.8	10.7	88	10.9
2019	133.7	255.8	145.1	62.5	65.5	68.7	161.7	276.9	57.9	22	105.6	86.5
2020	199.9	1.9	214.7	111.3	64.2	63.9	194	249.2	21.2	0.3	89.7	30.6
2021	40.3	27.8	74.1	200.8	74.1	80.2	329.3	96.2	202	71.3	0.3	42.2
2022	168.8	122.8	11	22	70.4	68.1	296.7	260.2	115.1	60.8	32.5	11.5



Graph showing Monthly rainfall data of the district Kullu

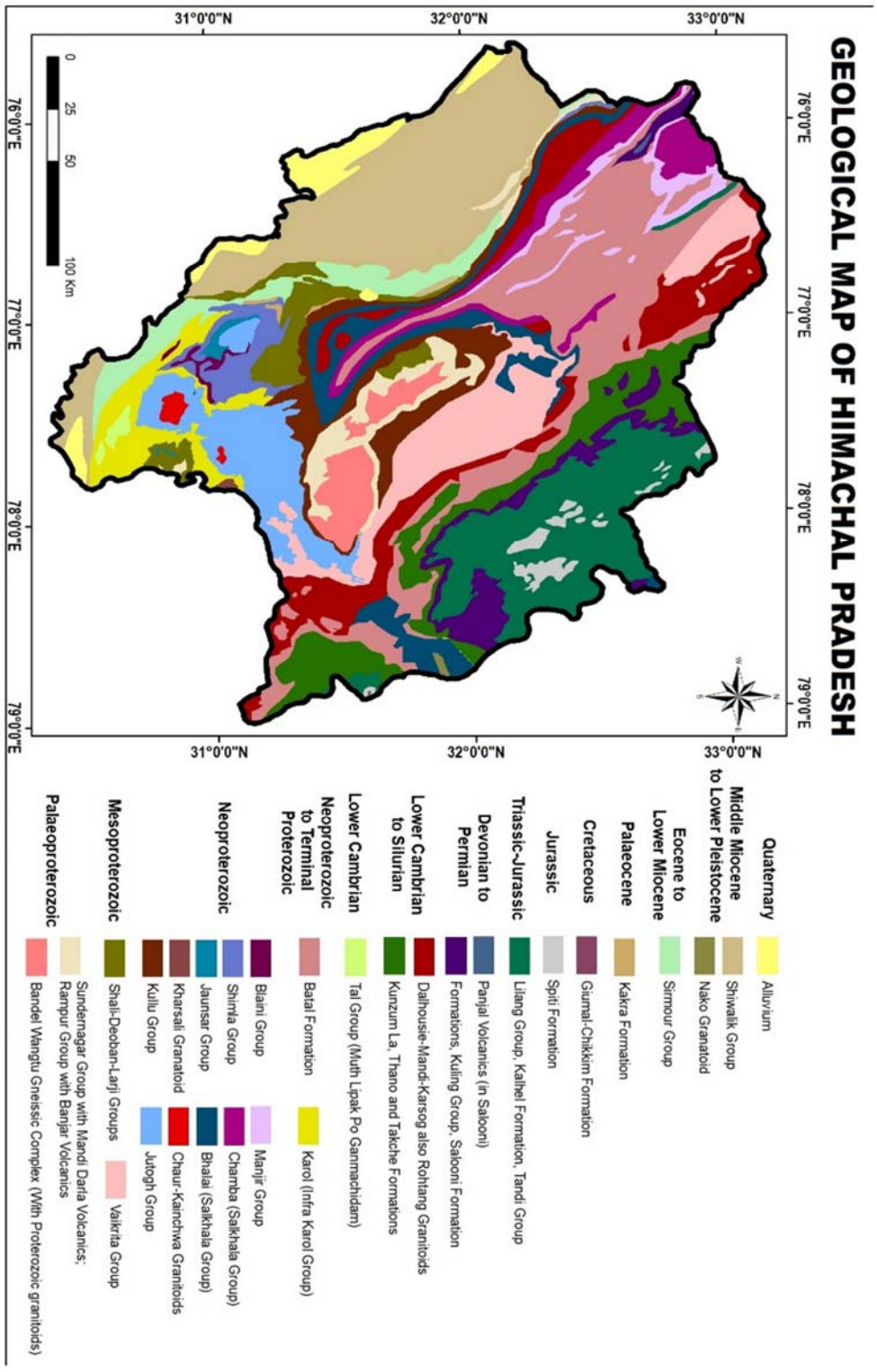
11. GEOLOGY AND MINERAL WEALTH

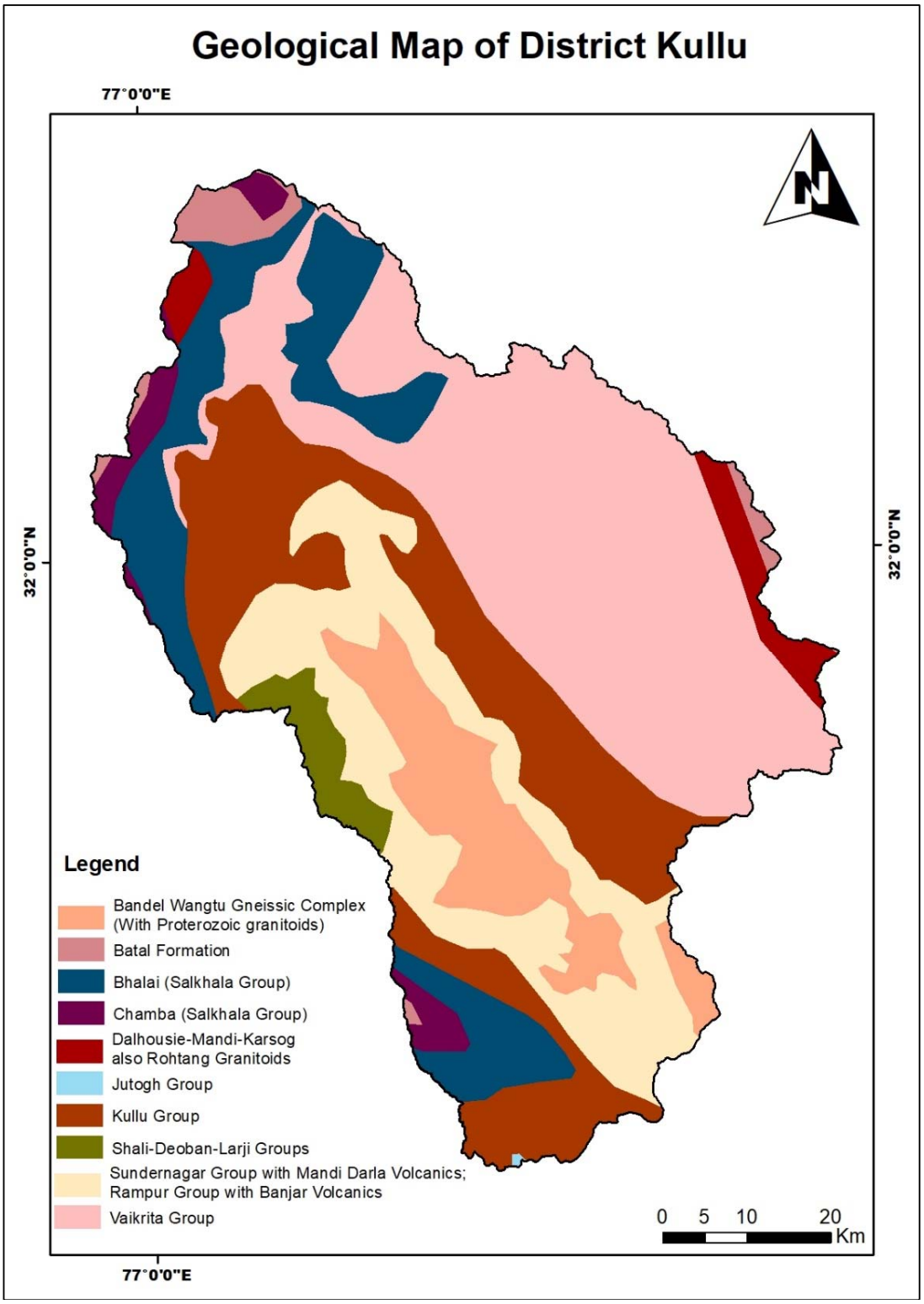
The geology of Himachal Pradesh is dominated by Precambrian rocks that were assembled and deformed during the India-Asia collision and the subsequent Himalayan orogeny. The Northern Indian State of Himachal Pradesh is located in the Western Himalayas. It has a rugged terrain, with elevation ranging from 320m to 6975m. Rock materials in the region are largely from the Indian craton, and their ages range from the Paleoproterozoic to the present day. It is generally agreed that the Indian craton collided with Asia 50-60 million years ago (Ma). The Rock sequences were thrust and folded immensely during the collision. The area has also been shaped by focused orographic precipitation, glaciation and rapid erosion.

Kullu district falls in toposheet No. 53E/NW, having a total area of 5495 sq. Km lying between latitudes 31°41' and 31°58' and longitudes 77°10' and 77°21'. The various rock formations met with are the Chail Series, the Larji Series and the Banjar Series. These formations are separated by two thrusts, viz, the Chail thrust and Jaunsar thrust. In the western part of the map, the Chails are thrust over the Larjis while in the eastern part, the Larjis (Krol or Shali) are thrust over by Jaunsars. Due to erosion, the

rocks of the Larji Series are exposed in a window. The area is marked by a number of hills and valleys characteristics of the sub-Himalayan topography. The highest and the lowest points are marked, by the Talawa Peak (3330 metres) and Bhuntar (943 metres) respectively by the Sainj and the Bajaura nalas and the Mahul Khad.

The major portion of the area is covered by the evergreen forests of the Deodar, Pine, Walnut and Kil trees. Small patches of cultivable land are in the form of terraces. Wheat, maize, and paddy are the main crops. The rock formations that met within the area from east to west are the Banjar series with associated basic rocks; the Larji Series and the Chail Series. The major part of the area consists of the rocks of the Banjar Series most of which farms the peaks and higher ranges of hills. The rocks of the Larji series are at lower levels. The contacts of the above-mentioned rock formations are marked by two thrusts. The above stratigraphic sequence of the rocks is established by field observations.


GEOLOGICAL MAP OF HIMACHAL PRADESH
76°0'0"E
77°0'0"E
78°0'0"E
79°0'0"E
33°0'0"N
32°0'0"N
31°0'0"N
0
25
50
100 Km
Quaternary
Alluvium
Middle Miocene to Lower Pleistocene
Shiwalik Group
Nako Granatoid
Eocene to Lower Miocene
Sirmour Group
Palaeocene
Kakra Formation
Cretaceous
Giumal-Chikkim Formation
Jurassic
Spiti Formation
Triassic-Jurassic
Liliang Group, Kalhel Formation, Tandi Group
Devonian to Permian
Panjal Volcanics (in Salooni)
Formations, Kuling Group, Salooni Formation
Lower Cambrian to Silurian
Dalhousie-Mandi-Karsog also Rohtang Granitoids
Kunzum La, Thano and Takche Formations
Lower Cambrian
Tal Group (Muth Lipak Po Ganmachidam)
Neoproterozoic to Terminal Proterozoic
Batal Formation
Karol (Infra Karol Group)
Neoproterozoic
Blaini Group
Manjir Group
Shimla Group
Chamba (Salkhala Group)
Jaunsar Group
Bhalai (Salkhala Group)
Kharsali Granatoid
Chaur-Kainchwa Granitoids
Kullu Group
Jutogh Group
Mesoproterozoic
Shali-Deoban-Larji Groups
Vaikrita Group
Palaeoproterozoic
Sundernagar Group with Mandi Darla Volcanics;
Rampur Group with Banjar Volcanics
Bandel Wangtu Gneissic Complex (With Proterozoic granitoids)



Chail Series:

The Chail Series comprises the oldest rocks in the area. They are exposed on the western and partly on the eastern parts of the area. The Chail Series comprises slates, phyllites with thin bands of quartzite, garnetiferous gneiss and schists and cream and blue-colored, sheared, calcareous quartzite and limestones associated with bands of carbonaceous slates, phyllites and schists. Particularly, the presence of limestone, carbonaceous slates and phyllites in them recall similarities with the Chail

Series of the type section in the Simla area. Sheared calcareous quartzite and limestone associated with carbonaceous phyllites and schists: The lowest member of the Chail Series comprises pink and grey-coloured sheared calcareous quartzite and limestone associated with carbonaceous phyllites and schist. They are observed along the Chail thrust. Exposures of limestone are seen about 0.4 km east of Bhib and in the Nala north of Sajohr. A patch of this is also exposed at 0.2 km north of Jia. The outcrops are discontinuous as they are cut off at places by the thrust. The Chail limestone is greyish-blue to cream-coloured. Thin bands of greyish slates occur within these limestones. The limestones are associated with carbonaceous schists and phyllites. The carbonaceous phyllites and schists are well-foliated and at places they are graphitic. The limestones are sheared at places probably due to the thrusting movement. They are highly folded as seen north of Jia in the eastern part of the area.

Gneisses and Schists:

The limestones are overlain by gneisses and schists. They are exposed in the vicinity of the Chail thrust. The outcrops continue from Bhansoli in the south up to Mahul-Khad in the western part and from 2 km. North of Jai up to Jhori in the eastern part of the area. The gneisses are grey to green in colour and medium-grained in texture and are well foliated with dip ranging from 20° to 50°. In places, they appear to be quartzose. The schists are sea green in colour and show well-developed schistosity. They are biotite schist, quartz-schist and chlorite schists. Biotite schists occur as thin bands and are insignificant when compared to quartz schists and quartz chlorite schists. They are profusely studded with garnets, not exceeding 1 to 2 mm. In diameter, as seen near Sohr and Khokhan in the western part and near Talote in the eastern part of the area. The garnetiferous schist appears to have undergone retrograde metamorphism. In thin sections, garnets occur, as snowballs which show a spiral arrangement of inclusions of quartz, biotite etc. indicating that garnets have been rolled by differential movement of the matrix of the rock. This indicates that the rock has undergone dynamo thermal metamorphism. Quartz schist and quartz-chlorite schists are extensively developed and show well-developed schistosity and at places, lenses of quartz are seen showing badinage structure along the plane of schistosity. They are soft and rather friable owing to the presence of thin lenticels of quartz. At places, muscovite mica is seen associated with the schists, particularly at Bholan in the western portion of the mapped area.

Table showing Litho-stratigraphy of the area

Series	Lithology
Recent	River terrace and alluvium (unassorted boulders, cobbles and pebbles of granite, granite gneiss, silicified phyllite, slates, dolomite, limestone etc.)
Larji Series (Krol or Shali)	Predominantly dolomite interceded with thin bands of quartzites and limestone occasionally with thin parting of slate and phyllite.
Banjar Series (Jaunsars ?)	Massive quartzite, slate, phyllite interbedded with bands of quartzites, gritty phyllites calcareous quartzite and conglomeratic quartzites.
Chail Series	Slates, phyllites with bands of quartzites, garnetiferous gneisses and schists cream and blue coloured, sheared, calcareous quartzites and limestone associated with carbonaceous phyllite and schists.

The tectonic sequence in the area is given below:-

Chail Series
----------THRUST ----------T_1----------
Banjar Series (Jaunsars ?)
----------THRUST ----------T_2----------
(Larji Series Krols or Shalis ?)

Quartzites:

Quartzites, not exceeding 5 metres in thickness occur as in inter-bedded members. In places, they appear as major outcrops as seen west of Khokhan. They are brownish-grey in colour. They do not show any sedimentary features such as current bedding and ripple marks. In places, they show a slightly schistose structure, probably due to the development of sericite and muscovite mica.

Slates and Phyllites:

Slates and phyllites are pale green to grey in colour. They form the uppermost members of the Chail series. Thin bands of quartzites occur inter-bedded with the slates and phyllites. The latter is highly puckered and friable.

Banjar Series:

The Banjar Series in this area comprises a group of low-grade metamorphic rocks mostly quartzites, slates, phyllites and chlorite schists. They were first mapped around Banjar town in the southern part of the area by Dass and Srikantia in 1961-62. From the field observations, this group of rocks may be assigned a younger age to the Chail Series which shows a relatively higher grade of metamorphism. Further, as this series contains conglomeratic quartzite their resemblances with the rocks of the Januarys Series of the type Simla area have been inferred and correlated. This– correlation is tentative. The various units of the Banjar Series met within the area from west to east are, slates, phyllites with inter-bedded quartzites, schists and a thick horizon of massive quartzite. Slates, phyllites and schists with interbedded quartzites Slates are steel grey in colour. Well-developed lavages are almost parallel to bedding. They generally grade into phyllites and chlorite schists. Phyllites form a considerable thickness. They are greyish-green in colour. They show well-developed foliation. They are highly puckered and crumpled. Near their contact with the massive quartzite, phyllite grade into chlorite schists. They contain lenses of quartz along the planes of schistosity. Phyllites and schists are siliceous in places. Carbonaceous phyllites varying from 2 to 4 metres in width and 10-15 metres in length are seen associated with the phyllites near Chong. Specks of pyrite are seen within the carbonaceous

phyllite. Quartzite bands varying in width from 5 to 30 metres occur interbedded within the slates, phyllites and schists. This is a characteristic association in this area. The quartzites are white, whitish-grey, greenish and pinkish in colour. At places, they are quarried and used for roofing purposes. Massive quartzite A major band of quartzite with an outcrop width of over one km is seen to overlie conformable the slate-phyllite member. They are seen to extend from Dotha in the south up to Shat in the north. The quartzites are white in colour. They are massive and lack sedimentary features such as current bedding and ripple marks. In places, sericite mica is developed in the quartzites as seen near Borogi village. Basic intrusive at several places basic rocks are found in the form of sills and dykes. Near Dhara and Paral, the phyllites are intruded by basic rocks varying in thickness from 2 to 5 metres. The traps are dark green in colour, compact and hard. In some places, they are vesicular. Vesicles are filled up by secondary minerals such as quartz and calcite. In places, these have been metamorphosed into chlorite schists.

Larji Series (Krols or Shali):-

The rocks of the Larji Series occur in a 'window' between the Jaunsar- and the Chail thrusts, the exposures of the Larji Series are seen to continue from Takoli in the south up to Mahul Khad in the north. Further north no exposure is seen. The Larji Series comprises predominantly limestone and dolomite with thin partings of slates. The correlation of the Larji Series with the Krol or the Shali Series of the Simla area is only tentative. No sequence of the Krol series is established in the Larji area and we do not find the exposure of other units of the series as observed in the type area of the Krol belt.

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 Kullu 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. A Task Force comprising of team of Geologists, the Mining officer of the concerned District and other officials from the department was constituted for the purpose of preparation of the District Survey Report (DSR).

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 Murshidabad district also describes the general geographical profile of the district, distribution of natural resources, livelihood, climatic condition and sources of revenue generation

The objectives of the District Survey Report are as follows:

1. To identify and quantify minor mineral resources for optimal utilization.

2. To regulate sand and gravel mining, identification of site-specific end-use consumers and reduction in demand and supply gaps.
3. To facilitate the use of information technology (IT) for surveillance of sand mining at each step.
4. To enable environmental clearance for the cluster of sand and gravel mines.
5. To restrict illegal mining.
6. To reduce occurrences of flood in the area.
7. To maintain the aquatic habitats.
8. To protect ground water in the area by limiting extraction of material in riverbeds to an elevation above the base flow.
9. To maintain data records viz. details of the mineral resource, potential area, lease, approved mining plan, co-ordinates of lease hold areas, and revenue generation.
10. To design a scientific mining plan and estimate the ultimate pit limit.
11. To frame a comprehensive guideline for mining of sand and other minor minerals.

The District Survey Report (DSR) comprises secondary data on geology, mineral resources, climate, topography, land form, 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. Data on lease and mining activities in the district, revenue etc.

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.

The Details of statutory Guidelines for ***sand or gravel or Hill slope*** mining and Restriction on grant of mining lease. -

(1) No mining lease shall be granted in respect of land within a distance of two kilometres from the immediate outer limits of Municipal Corporation/Municipal Committee, one kilometre from the immediate outer limits of Nagar Panchayat, except under special circumstances by the Competent Authority.

(2) No mining lease shall be granted upto 100 metres from the edge of National Highway/Express way, 25 metres from the edge of State Highway and 10 metres from the edge of other roads except on special exemption by the Joint Inspection Committee.

(3) No mining operation shall be permitted within a distance stipulated by the Joint Inspection Committee from public utilities.

(4) No mineral concession shall be granted to a person who does not hold a Certificate of Approval.

(5) No mining lease shall be granted to a person who is not a citizen of India.

(6) No mining lease and installation of a stone crusher shall be granted to a person in a Scheduled area without the prior recommendation of the concerned Gram Sabha.

(7) In areas other than the Scheduled area for granting a mining lease and permission for installation of a stone crusher, the concerned Gram Panchayat shall be consulted and it shall be incumbent upon the Gram Panchayat to convey its approval or refusal within a period of three months failing which it shall be deemed that the Gram Panchayat has no objection. In case of refusal or any objection raised by the concerned Gram Panchayat, sufficient reasons for such refusal/objection shall be recorded in writing. The objection shall be reviewed/decided by the granting authority after taking input/opinion from the Joint Inspection Committee: Provided that for grant of mining lease of brick earth and ordinary earth clay in private lands

having an area less than 5-00 Hectares, no consultation and approval of the Gram Panchayat concerned shall be required.

(8) No mining lease shall be granted in the forest area without forest clearance from the Central Government in accordance with the provisions of the Forest Conservation Act, 1980 and the rules made thereunder.

(9) No mining lease shall be granted in respect of any such minor mineral as the Government may notify in this behalf from time to time.

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). The district of Kullu forms a transitional zone between the Lesser and Greater Himalayas and presents a typical rugged mountainous terrain. The district has high mountains, rivers, rivulets and valleys. The altitude of the district ranges from 1500 meters to 4800 meters from the mean sea level.

Surface mining makes up a huge percentage of mining projects in the Kullu district. Surface mining refers to the removal of the surface minerals to access minerals underneath. In particular, surface mining is used to retrieve minor minerals like stone, sand, gravels etc. or major minerals like Limestone coal, iron and other metals. There is no major mineral available in the 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 45^0.
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 is crushed in 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 45^0.

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

3.1 General

Kullu is a district in Himachal Pradesh, India. It borders Shimla district to the south, Mandi and Kangra districts to the west, Kinnaur to the east and the Lahaul and Spiti district to the north and east. The largest valley in this mountainous district is the Kullu Valley. The Kullu valley follows the course of the Beas River, and ranges from an elevation of 833 m above sea level at Aut to 3330 m above sea level at the Atal Tunnel South Portal, below the Rohtang Pass. The town of Kullu, located on the right side of the Beas River, serves as the administrative headquarters of the Kullu district. The Kullu district also incorporates several riverine tributary valleys of the Beas, including those of the Parvati, Sainj, and Tirthan rivers, and thus some regions somewhat distant from the Kullu valley. The economy of the district relies mainly on horticulture, agriculture, tourism, and traditional handicrafts.

The geomorphology of the area 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.

I) Mountainous area- Dhauladhar and Pir-Panjal ranges trend NW-SE and peaks ranging in height between 4200-5000m above mean sea level.
II) Snow-covered area- Northern and northeastern parts of the Kullu district are covered with snow and a snow line exists in this area.
III) Denuded hills- The presence of residual ridges along the intermontane valleys suggest that these ridges are the remnants of high relief mountains
and formed active erosion.
IV) Valley area - Fluvial processes and structural disturbances in the area form intermontane valleys. Kullu valley is elongated and broadly v-shaped in cross-section and denuded hills along the sides.
V) Terrace area- A number of terraces are formed along the river valleys in Kullu district. Terraces are generally noticed on the western bank of the Beas River as well as on the right banks of River Satluj. Two levels of terraces are demarcated near Bhunter, which are covered with thick vegetation.

The elevation of the Kullu district ranges from 914m to 4084m above mean sea level with varied agro-climatic conditions. The texture of the soil ranges from sandy loam to clay loam and the colour of the soil also varies from brown to dark brown. Generally, the soil is acidic in nature. The depth of the soil varies from 50 to 100 cms. But despite this, all the agro-climatic conditions provide a range of potentialities for growing cash crops like off-season vegetables, seed potatoes, pulses and temperate fruits

4. GEOLOGY OF THE DISTRICT

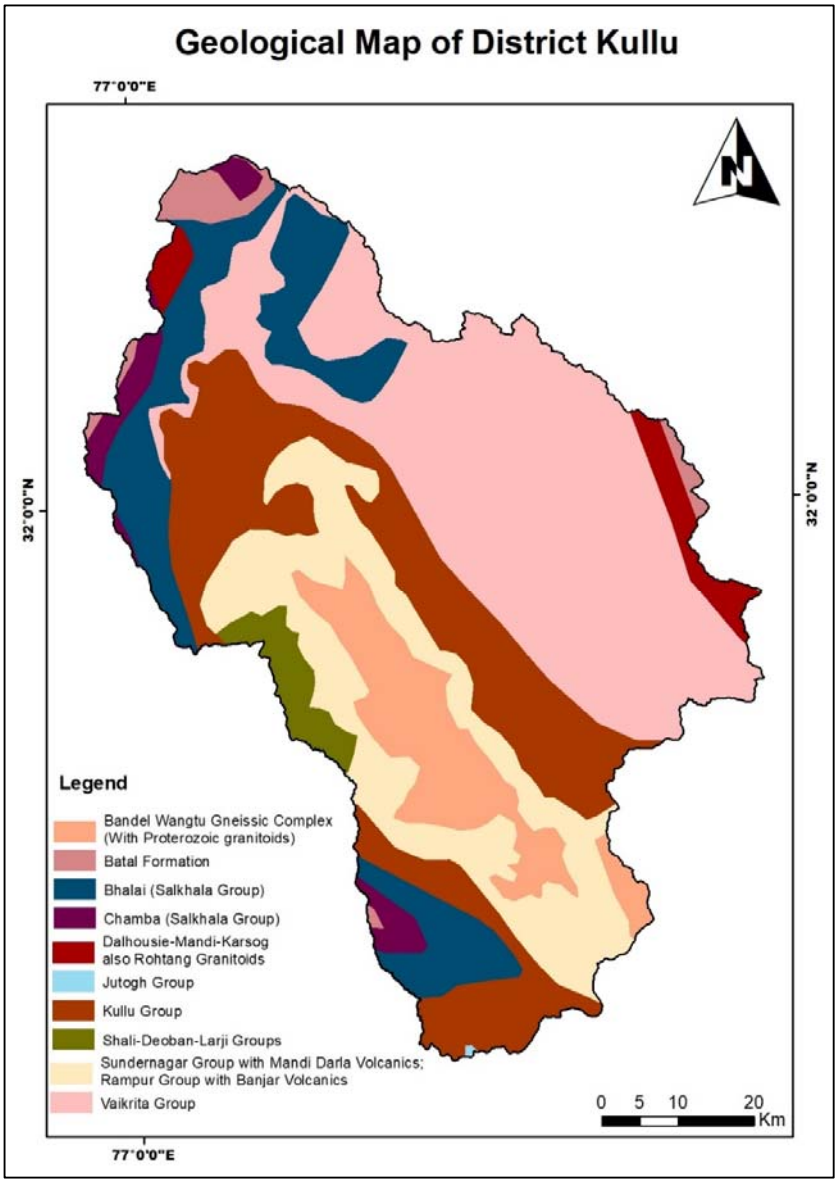
The geology of Himachal Pradesh is dominated by Precambrian rocks that were assembled and deformed during the India-Asia collision and the subsequent Himalayan orogeny. The Northern Indian State of Himachal Pradesh is located in the Western Himalayas. It has a rugged terrain, with elevation ranging from 320m to 6975m. Rock materials in the region are largely from the Indian craton, and their ages range from the Paleoproterozoic to the present day. It is generally agreed that the Indian craton collided with Asia 50-60 million years ago (Ma). The Rock sequences were thrust and folded immensely during the collision. The area has also been shaped by focused orographic precipitation, glaciation and rapid erosion.

Kullu district falls in toposheet No. 53E/NW, having a total area of 5495 sq. Km lying between latitudes 31°41' and 31°58' and longitudes 77°10' and 77°21'. The various rock formations met with are the Chail Series, the Larji Series and the Banjar Series. These formations are separated by two thrusts,

viz, the Chail thrust and Jaunsar thrust. In the western part of the map, the Chails are thrust over the Larjis while in the eastern part, the Larjis (Krol or Shali) are thrust over by Jaunsars. Due to erosion, the rocks of the Larji Series are exposed in a window. The area is marked by a number of hills and valleys characteristics of the sub-Himalayan topography. The highest and the lowest points are marked, by the Talawa Peak (3330 metres) and Bhuntar (943 metres) respectively by the Sainj and the Bajaura nalas and the Mahul Khad.

Chail Series:

The Chail Series comprises the oldest rocks in the area. They are exposed on the western and partly on the eastern parts of the area. The Chail Series comprises slates, phyllites with thin bands of quartzite, garnetiferous gneiss and schists and cream and blue-coloured, sheared, calcareous quartzite and limestones associated with bands of carbonaceous slates, phyllites and schists. Particularly, the presence of limestone, carbonaceous slates and phyllites in them recall similarities with the Chail Series of the type section in the Simla area. Sheared calcareous quartzite and limestone associated with carbonaceous phyllites and schists: The lowest member of the Chail Series comprises pink and grey-coloured sheared calcareous quartzite and limestone associated with carbonaceous phyllites and schist.



They are observed along the Chail thrust. Exposures of limestone are seen about 0.4 km east of Bhib and in the Nala north of Sajohr. A patch of this is also exposed at 0.2 km north of Jia. The outcrops are discontinuous as they are cut off at places by the thrust. The Chail limestone is greyish-blue to cream-coloured. Thin bands of greyish slates occur within these limestones. The limestones are associated with carbonaceous schists and phyllites. The carbonaceous phyllites and schists are well-foliated and at places they are graphitic. The limestones are sheared at places probably due to the thrusting movement. They are highly folded as seen north of Jia in the eastern part of the area.

Gneisses and Schists:

The limestones are overlain by gneisses and schists. They are exposed in the vicinity of the Chail thrust. The outcrops continue from Bhansoli in the south up to Mahul-Khad in the western part and from 2 km. North of Jai up to Jhori in the eastern part of the area. The gneisses are grey to green in colour and medium-grained in texture and are well foliated with dip ranging from 20° to 50°. In places, they appear to be quartzose. The schists are sea green in colour and show well-developed schistosity. They are biotite schist, quartz-schist and chlorite schists. Biotite schists occur as thin bands and are insignificant when compared to quartz schists and quartz chlorite schists. They are profusely studded with garnets, not exceeding 1 to 2 mm. In diameter, as seen near Sohr and Khokhan in the western part and near Talote in the eastern part of the area. The garnetiferous schist appears to have undergone retrograde metamorphism. In thin sections, garnets occur, as snowballs which show a spiral arrangement of inclusions of quartz, biotite etc. indicating that garnets have been rolled by differential movement of the matrix of the rock. This indicates that the rock has undergone dynamo thermal metamorphism. Quartz schist and quartz-chlorite schists are extensively developed and show well-developed schistosity and at places, lenses of quartz are seen showing badinage structure along the plane of schistosity. They are soft and rather friable owing to the presence of thin lenticels of quartz. At places, muscovite mica is seen associated with the schists, particularly at Bholan in the western portion of the mapped area.

Table showing Litho-stratigraphy of the area

Series	Lithology
Recent	River terrace and alluvium (unassorted boulders, cobbles and pebbles of granite, granite gneiss, silicified phyllite, slates, dolomite, limestone etc.)
Larji Series (Krol or Shali)	Predominantly dolomite interceded with thin bands of quartzites and limestone occasionally with thin parting of slate and phyllite.
Banjar Series (Jaunsars ?)	Massive quartzite, slate, phyllite interbedded with bands of quartzites, gritty phyllites calcareous quartzite and conglomeratic quartzites.
Chail Series	Slates, phyllites with bands of quartzites, garnetiferous gneisses and schists cream and blue coloured, sheared, calcareous quartzites and limestone associated with carbonaceous phyllite and schists.

The tectonic sequence in the area is given below:-

Chail Series
----------THRUST ----------T_1----------
Banjar Series (Jaunsars ?)
----------THRUST----------T_2----------
(Larji Series Krols or Shalis ?)

Quartzites:

Quartzites, not exceeding 5 metres in thickness occur as in inter-bedded members. In places, they appear as major outcrops as seen west of Khokhan. They are brownish-grey in colour. They do not show any sedimentary features such as current bedding and ripple marks. In places, they show a slightly schistose structure, probably due to the development of sericite and muscovite mica.

Slates and Phyllites:

Slates and phyllites are pale green to grey in colour. They form the uppermost members of the Chail series. Thin bands of quartzites occur inter-bedded with the slates and phyllites. The latter is highly puckered and friable.

Banjar Series:

The Banjar Series in this area comprises a group of low-grade metamorphic rocks mostly quartzites, slates, phyllites and chlorite schists. They were first mapped around Banjar town in the southern part of the area by Dass and Srikantia in 1961-62. From the field observations, this group of rocks may be assigned a younger age to the Chail Series which shows a relatively higher grade of metamorphism. Further, as this series contains conglomeratic quartzite their resemblances with the rocks of the Januarys Series of the type Simla area have been inferred and correlated. This– correlation is tentative. The various units of the Banjar Series met within the area from west to east are, slates, phyllites with inter-bedded quartzites, schists and a thick horizon of massive quartzite. Slates, phyllites and schists with interbedded quartzites Slates are steel grey in colour. Well-developed lavages are almost parallel to bedding. They generally grade into phyllites and chlorite schists. Phyllites form a considerable thickness. They are greyish-green in colour. They show well-developed foliation. They are highly puckered and crumpled. Near their contact with the massive quartzite, phyllite grades into chlorite schists. They contain lenses of quartz along the planes of schistosity. Phyllites and schists are siliceous in places. Carbonaceous phyllites varying from 2 to 4 metres in width and 10-15 metres in length are seen associated with the phyllites near Chong. Specks of pyrite are seen within the carbonaceous phyllite. Quartzite bands varying in width from 5 to 30 metres occur interbedded within the slates, phyllites and schists. This is a characteristic association in this area. The quartzites are white, whitish-grey, greenish and pinkish in colour. At places, they are quarried and used for roofing purposes. Massive quartzite A major band of quartzite with an outcrop width of over one km is seen to overlie conformable the slate-phyllite member. They are seen to extend from Dotha in the south up to Shat in the north. The quartzites are white in colour. They are massive and lack sedimentary features such as current bedding and ripple marks. In places, sericite mica is developed in the quartzites as seen near Borogi village. Basic intrusive at several places basic rocks are found in the form of sills and dykes. Near Dhara and Paral, the phyllites are intruded by basic rocks varying in thickness from 2 to 5 metres. The traps are dark green in colour, compact and hard. In some places, they are vesicular. Vesicles are filled up by secondary minerals such as quartz and calcite. In places, these have been metamorphosed into chlorite schists.

Larji Series (Krols or Shali):-

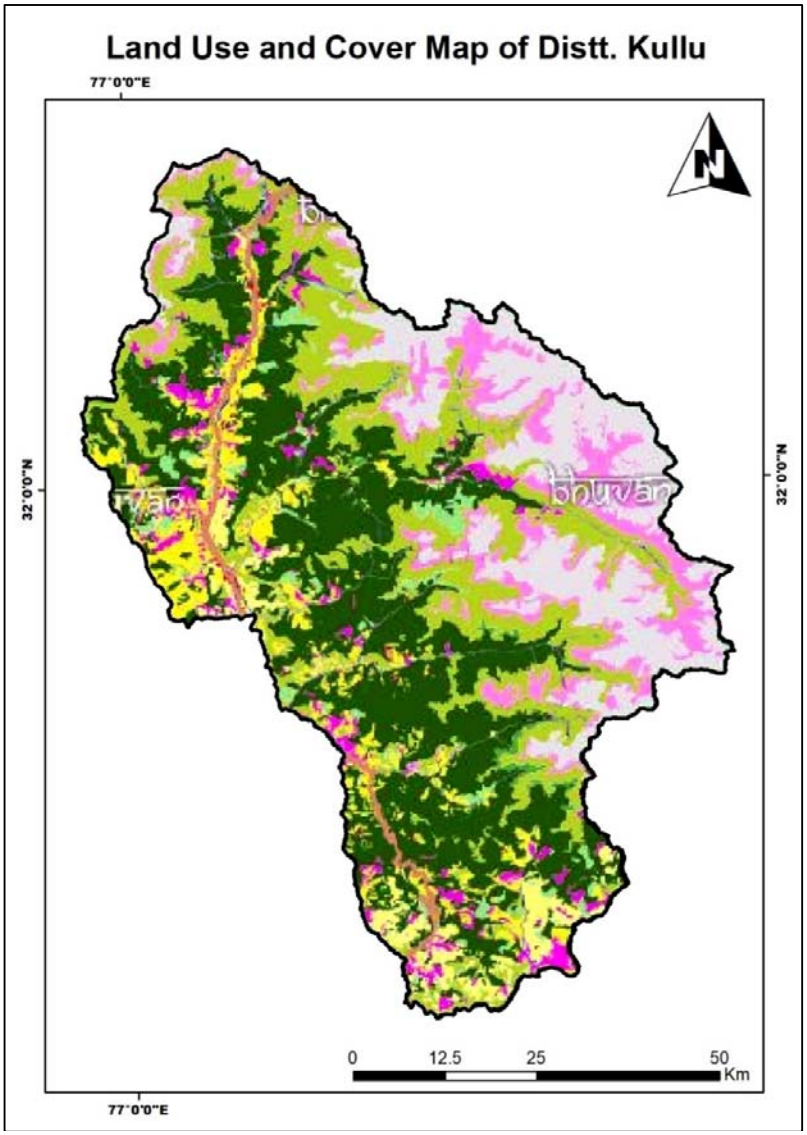
The rocks of the Larji Series occur in a 'window' between the Jaunsar- and the Chail thrusts, the exposures of the Larji Series are seen to continue from Takoli in the south up to Mahul Khad in the north. Further north no exposure is seen. The Larji Series comprises predominantly limestone and dolomite with thin partings of slates. The correlation of the Larji Series with the Krol or the Shali Series of the Simla area is only tentative. No sequence of the Krol series is established in the Larji area and we do not find the exposure of other units of the series as observed in the type area of the Krol belt.

5. Drainage of Irrigation Pattern

To increase crop production the importance of irrigation is well established. Multiple cropping and to accelerate the growth in production depends upon irrigation. The sources of irrigation are kuhls, lifts and tanks where rain water is stored. During the year 2008-09 the total net irrigated area in Kullu district was 2,553 hectares. In order to increase agricultural production steps like opening of new Kuhls, supply of improved seeds and fertilizers etc. are being taken by the state government. The major source of irrigation in the district is Kuhls and lift irrigation where water is lifted from the streams/rivers by electric motor. The other sources of irrigation are not in use due to the hilly terrain. More than half of the total irrigated area falls in Kullu and Manali Tahsils which constitutes the main Kullu valley.

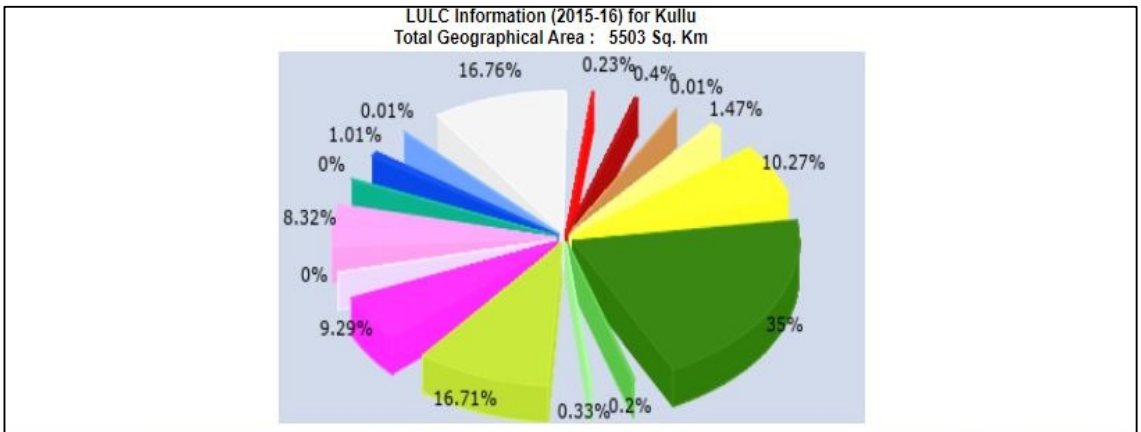
6. Land Utilization Pattern in the district: Forest, Agriculture, Horticulture, Mining etc.;

The district is comprised of many fertile valleys as well as high elevation areas. The cultivation is possible in small terraces of holdings in the high hills and the stream/khad basins in most parts of the district.



In the valleys, the cultivation is spread over a vast area. The cultivation of crops is confined mostly to flat valley areas while orchards cover the upper slopes of the valleys and river basins. Except for the valley area and stream/khad basins, most of the land is either under shrub forests or grassy land with Chil trees up to the height of 1,500 metres from the mean sea level and Kail, Deodar, Spruce, Poplar on the higher altitudes. It is only in the valleys that the land is mostly flat and fertile and the cultivation of cereals is done. Settlement operations in the district were carried out at different times. Prior to land reforms, most of the holdings are in the hands of land-lords who had leased out the same to the tenants on payment of rent in kind or cash. With the framing of tenancy laws, the landlordism has almost been abolished and after the implementation of the Himachal Pradesh Tenancy and Land reforms Act most of the cultivators have become the owners of the land held by them on tenancy except in the case of minors, widows, disabled and service personnel. Before the introduction of Land Reform Laws, the tenants in addition to paying different types of rents also used to render services to

the land-lords. With the introduction of land reform laws, the tenants have been relieved of the miserable plight to a greater extent and there has been a marked change in their social and economic status.



LULC Class		Area (Sq.Km)	LULC Class		Area (Sq.Km)
	Builtup,Urban	12.39		Builtup,Rural	22.08
	Builtup,Mining	0.31		Agriculture,Crop land	80.74
	Agriculture,Plantation	565.39		Forest,Evergreen/ Semi evergreen	1925.78
	Forest,Deciduous	10.87		Forest,Scrub Forest	18.32
	Grass/Grazing	919.28		Barren/unculturable/ Wastelands, Scrub land	511.4
	Barren/unculturable/ Wastelands, Sandy area	0.07		Barren/unculturable/ Wastelands, Barren rocky	458.01
	Wetlands/Water Bodies, Inland Wetland	0.09		Wetlands/Water Bodies, River/Stream/canals	55.49
	Wetlands/Water Bodies, Reservoir/Lakes/Ponds	0.55		Snow and Glacier	922.24

6.1 Agriculture

The economy of the district is basically agrarian. It largely depends on agriculture, fruit farming, and animal husbandry. Edaphic conditions in the district vary considerably. The average rainfall also varies in the valley as well as on the high altitude. The texture of the soil is generally sandy loam to clay loam. The salubrious agro-climatic conditions provide a range of potentialities for growing cash crops like off-season vegetables, seed potatoes, pulses, and temperate fruits apart from cereals, millets and oilseeds. The low lying fertile valleys where irrigation facilities are available, cultivation of off-season vegetables has emerged as an attractive source of income for the farming community.

As the cereal crops viz., maize, wheat, barley and pulses are generally the domain of unirrigated land, hence, no significant shift in the proportion of acreage under these crops has taken place over the period. However in case of paddy, 80 per cent of which is grown under irrigated conditions, a significant proportion of the area has been shifted to vegetables. A sharp decline in the area under food grains signifies the extent of commercialisation of agriculture in the district in recent years. The total cropped area as well as the area under food grains registered a declining trend at the state level too.

The district has different types of soil and agro-climate conditions which are quite suitable for the growth of various types of cereals, off-season vegetables, temperate and stone fruits and other cash crops. The major crops grown in the district are wheat and Paddy, Maize barley millet, besides these, potato and a variety of vegetables like green peas, cauliflower, cabbage, spinach tomatoes, etc. are also grown in the district. The adjoining village to the lease area is Patrisghat. The main crop of these villages is wheat and maize. Potato and cabbage are also grown in some parts of the village, as discussed in para 3.1. The lease area consists of hard rock covered with thin soil cover. As the such

area is not suitable for agriculture. The source of water and irrigation in District Kullu can be classified into five categories:

1. Lift irrigation scheme
2. Kuhls,
3. Well used for domestic purposes,
4. Tube wells,
5. Well used for irrigation.

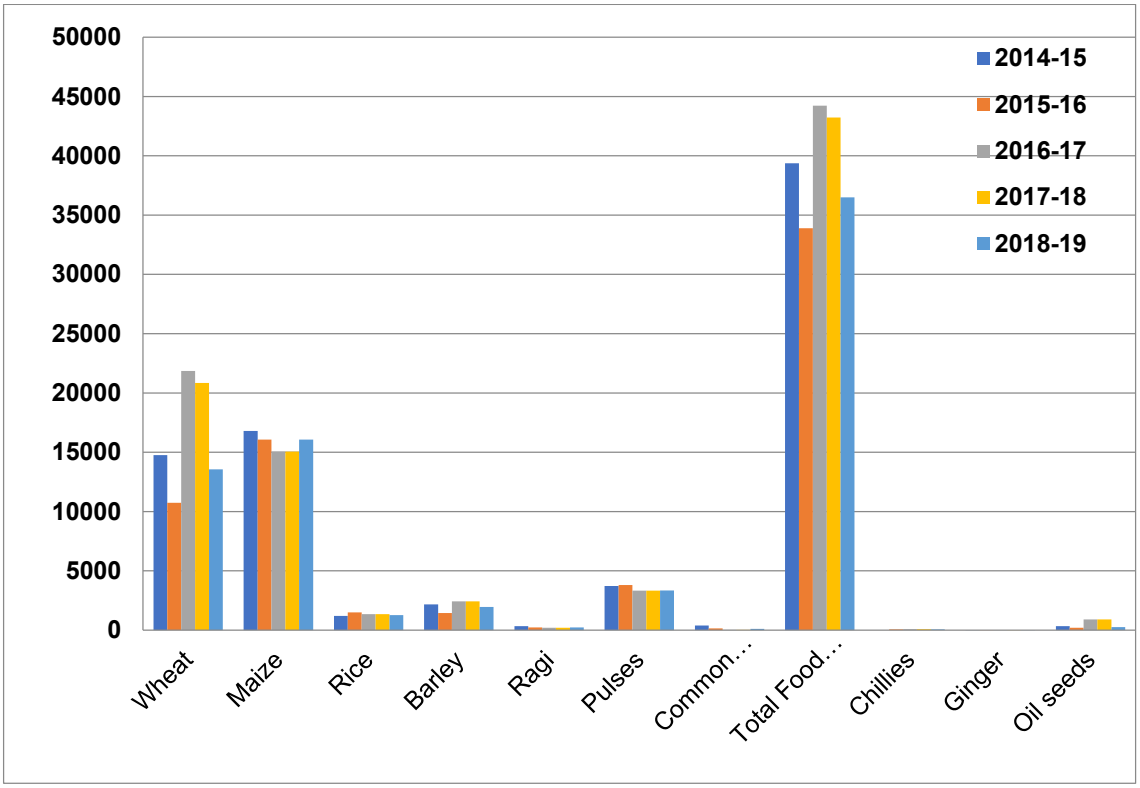
Major food crops are grouped into three categories:

1. Cereals,
2. Pulses,
3. Other food crops like Chilies, Ginger, Sugarcane and Turmeric.

Table showing area under different crops in hectares at Kullu district

Table showing Area under Different Crops (in Hectares) in Kullu District											
Year	Wheat	Maize	Rice	Barley	Ragi	Pulses	Common millets	Total Food grains	Chillies	Ginger	Oil seeds
2014-15	14762	16795	1203	2168	332	3724	390	39374	…	1	331
2015-16	10727	16058	1490	1445	219	3802	143	33884	72	1	189
2016-17	21846	15061	1344	2432	197	3334	14	44228	79	2	909
2017-18	20846	15061	1344	2432	197	3334	14	43228	79	2	909
2018-19	13567	16058	1258	1957	219	3344	103	36506	64	1	257

Source: Directorate of Land Records, HP

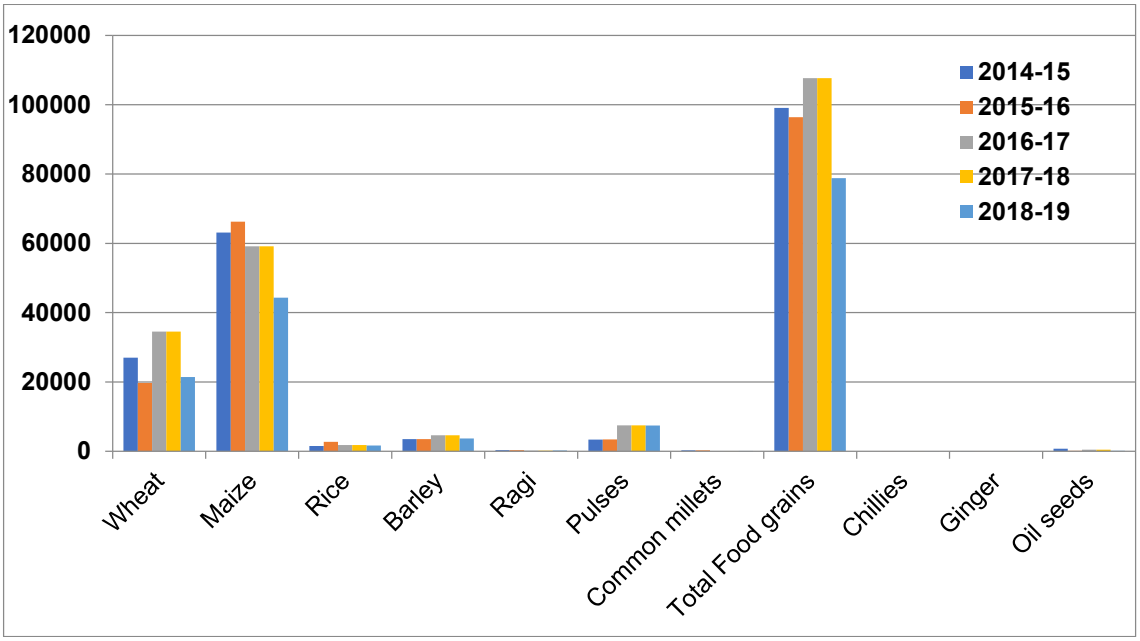


Graph showing area under different crops in hectares at Kullu district

Table showing the production of different crops in MT at Kullu district

Table showing Production of Different Crops (in MT) in Kullu District											
Year	Wheat	Maize	Rice	Barley	Ragi	Pulses	Common millets	Total Foodgrains	Chillies	Ginger	Oil seeds
2014-15	27017	63112	1509	3523	310	3339	275	99085	…	3	717
2015-16	19705	66253	2682	3523	310	3389	278	96410	38	2	118
2016-17	34544	59115	1758	4581	159	7458	14	107629	33	2	429
2017-18	34544	59115	1758	4581	159	7458	14	107629	33	2	429
2018-19	21436	44321	1648	3679	195	7428	102	78809	26	4	140

Source: Directorate of Land Records, HP

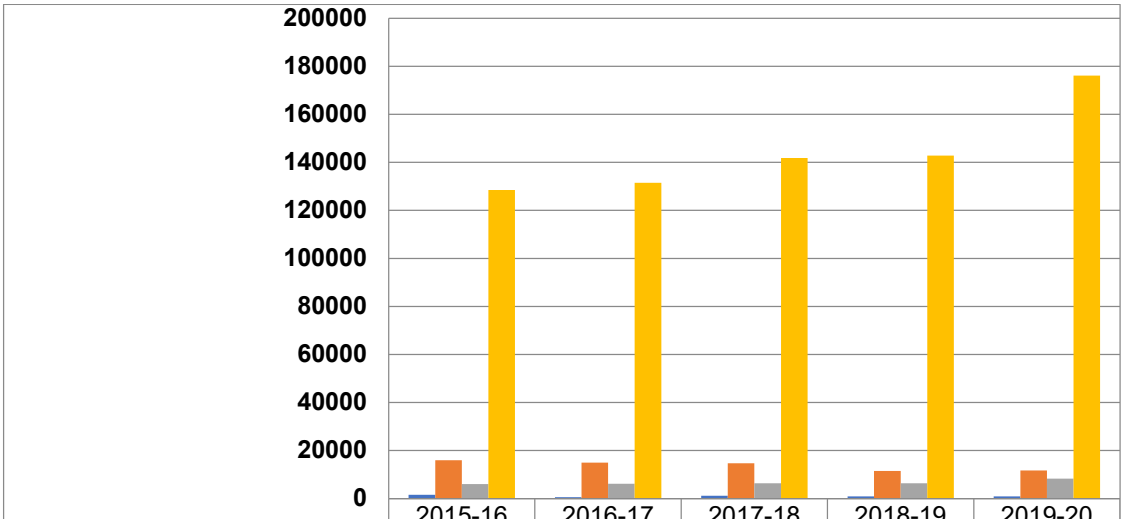


Graph showing the production of different crops in MT at Kullu district

Table showing the area in hectares & production of vegetables in tonnes

Area & Production of Vegetables (Distt Kullu)				
Year	Potato		Other Vegetables	
	Area (In Hectares)	Production (In Tonnes)	Area (In Hectares)	Production (In Tonnes)
2015-16	1600	15950	6046	128471
2016-17	600	14950	6180	131508
2017-18	1175	14700	6337	141854
2018-19	900	11520	6337	142842
2019-20	900	11700	8332	176126

Source: Directorate of Land Records, HP



	2015-16	2016-17	2017-18	2018-19	2019-20
Potato Area (In Hectares)	1600	600	1175	900	900
Potato Production (In Tonnes)	15950	14950	14700	11520	11700
Other Vegetables Area (In Hectares)	6046	6180	6337	6337	8332
Other Vegetables Production (In Tonnes)	128471	131508	141854	142842	176126

Graph showing the area in hectares & production of vegetables in tonnes

6.2 Horticulture

Horticulture is the mainstay of the economy of the district. It occupies about 23,746 hectares of area. Apple is the major fruit crop accounting for nearly 83 per cent of the total area under fruits. Stone fruits (like peach, plum & apricot), pomegranate, pear and kiwi are the other fruits grown in the district. The total production of fruits in the district was reported to be 3,13,906 tonnes. Root rot, root borer, canker, faulty training pruning, and improper ratio of pollinizers are the major problems associated with fruit crops. Plantation of new/improved crops/ varieties, maintenance of proper pollinizer ratio in the orchards, use of bees for better pollination, following recommended spray schedule, proper training pruning and scientific management are the suggested measures to boost horticultural production. The horticulture department is working for the upliftment of the orchardists through 15 schemes being run by it focussing mainly on the promotion and production of fruits, floriculture, aromatic and medicinal plants, protected cultivation, vermicompost, mushroom cultivation, processing, beekeeping and micro irrigation schemes.

The main horticulture produce of the area can be classified into the following five categories:

1. Apple
2. Other temperate fruits.
3. Sub-tropical fruits
4. Nuts and dry fruits
5. Citrus fruits.

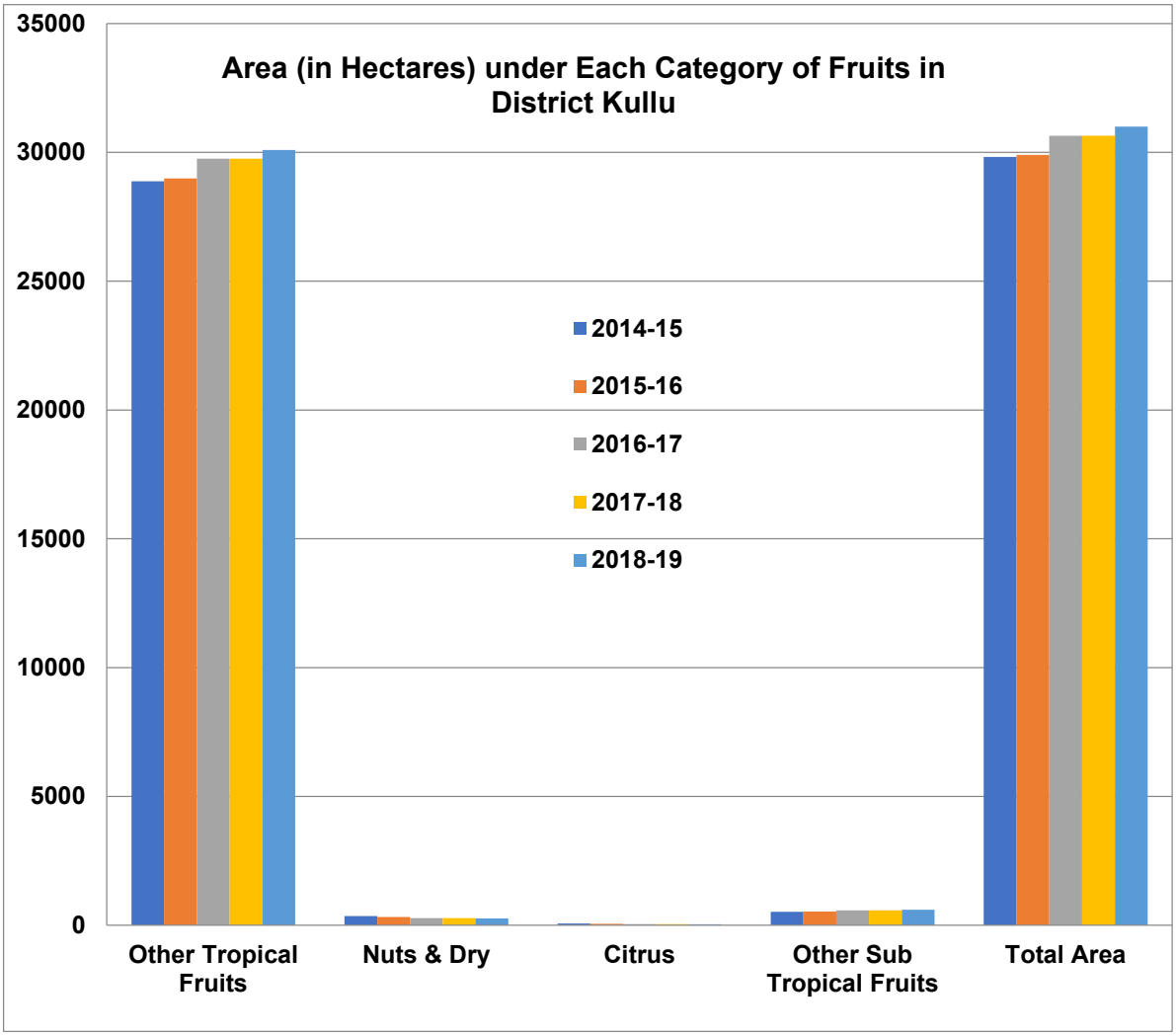
However, in the area under question, there is no scope for any Horticulture activities as the area is not suitable to grow the fruit plant.

Table showing area under each category of fruits in district Kullu

Table showing Area (In Hectares) under Each Category of Fruits in District Kullu					
Year	Other Tropical Fruits	Nuts & Dry	Citrus	Other Sub Tropical Fruits	Total Area
2014-15	28878	358	65	522	29823

2015-16	28989	322	56	536	29903
2016-17	29757	273	45	573	30648
2017-18	29757	273	45	573	30648
2018-19	30095	266	41	602	31004

Source: Directorate of Horticulture, HP



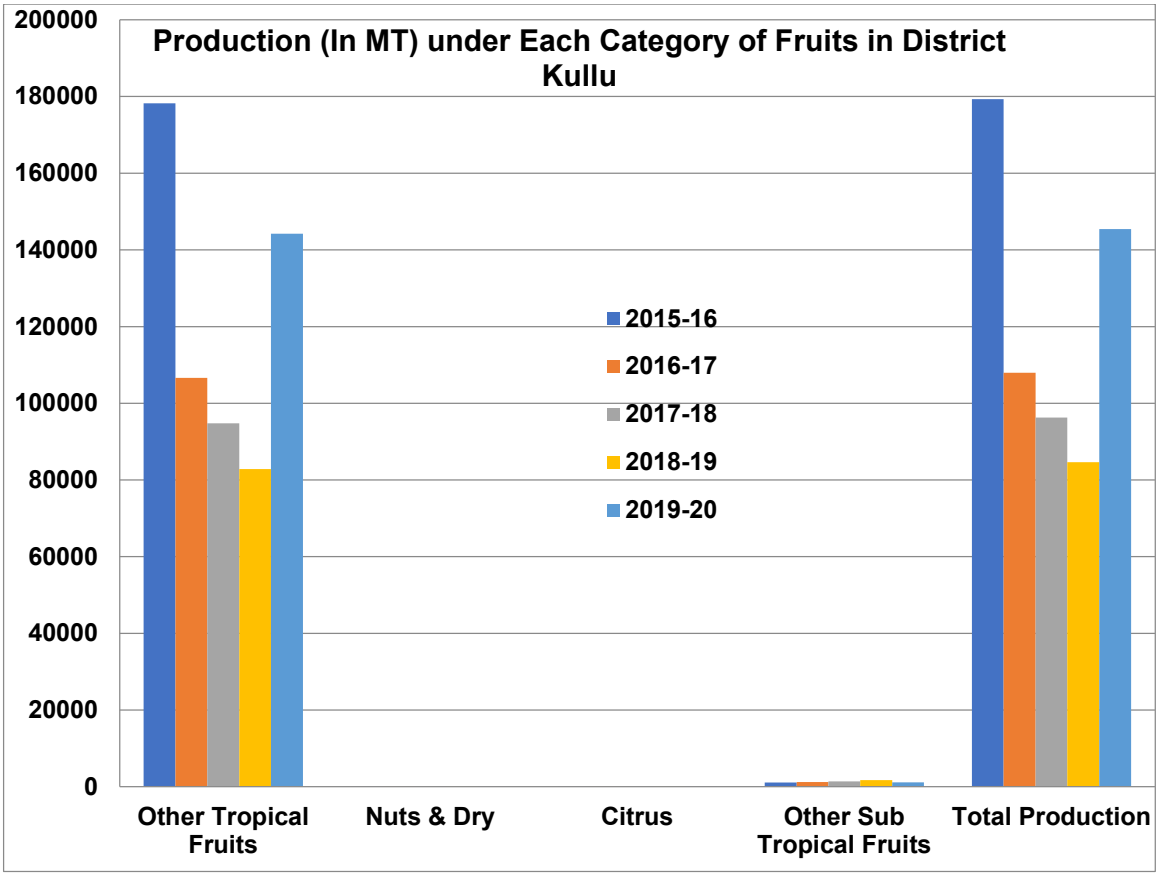
Graph showing area under each category of fruits in district Kullu

Table showing production under each category of fruits in district Kullu

Table showing Production (In MT) under Each Category of Fruits in District Kullu					
Year	Other Tropical Fruits	Nuts & Dry	Citrus	Other Sub Tropical Fruits	Total Production
2015-16	178178	46	10	1062	179296
2016-17	106653	54	8	1223	107938
2017-18	94787	67	9	1403	96266
2018-19	82847	33	13	1709	84602

2019-20	144218	35	17	1138	145408

Source: Directorate of Horticulture, HP



Graph showing production under each category of fruits in district Kullu

6.3 Animal Husbandry

Animal husbandry is a supplementary source of livelihood for a large chunk of the population in the district. It also serves as a source of FYM to agriculture. In fact, agriculture and animal husbandry are complementary enterprises; both are interdependent and provide support to each other. Various schemes for feed & fodder development, milk production, genetic upgradation of cattle and animal health improvement are being implemented by the Department of Animal Husbandry in the District. The details of the livestock in the district is as under:

I. Cow
II. Ox
III. Buffalo
IV. Sheep
V Goat
VI. Ponies

The following are important poultry bids:

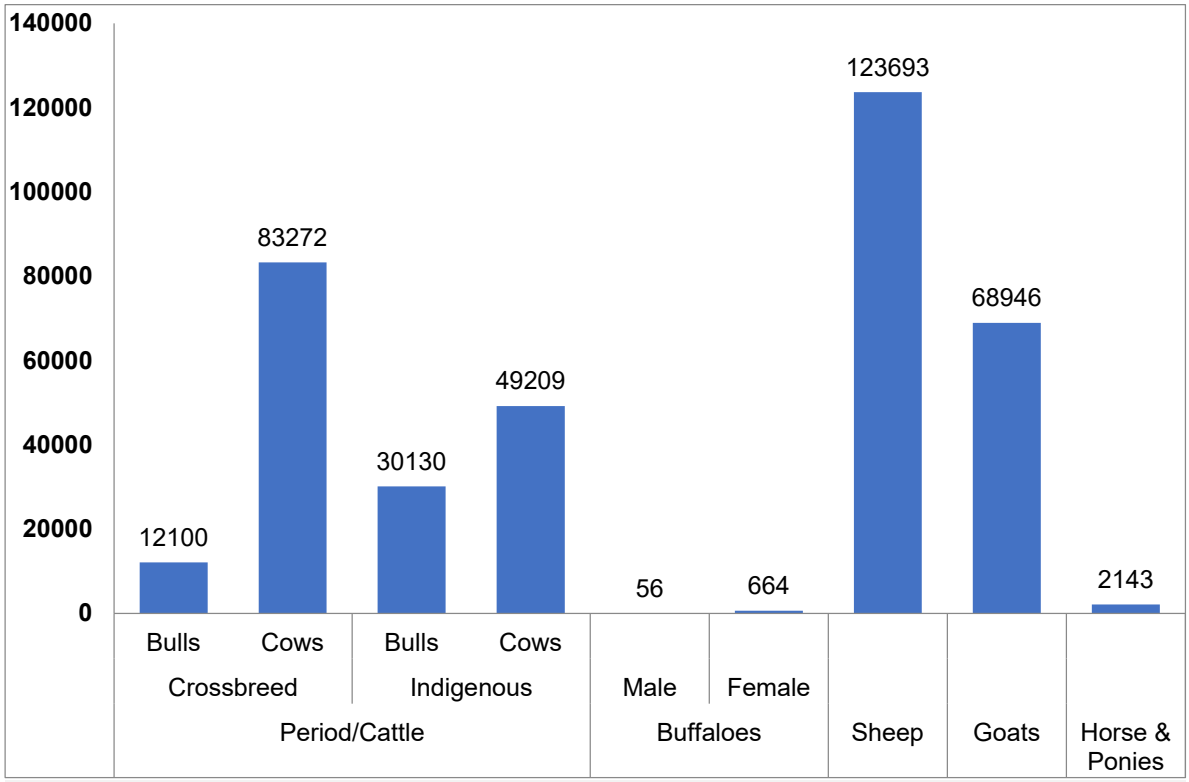
I. Fowl
II. Ducks (Rare)

Table showing Livestock Census in district Kullu

Animal Husbandry Population in District Kullu						
Year	Status	Period/Cattle	Buffaloes	Sheep	Goats	Horse &

		Crossbreed		Indigenous		Male	Female			Ponies
		Bulls	Cows	Bulls	Cows					
2012	At Kullu	12100	83272	30130	49209	56	664	123693	68946	2143

Source: Directorate of Animal Husbandry, HP

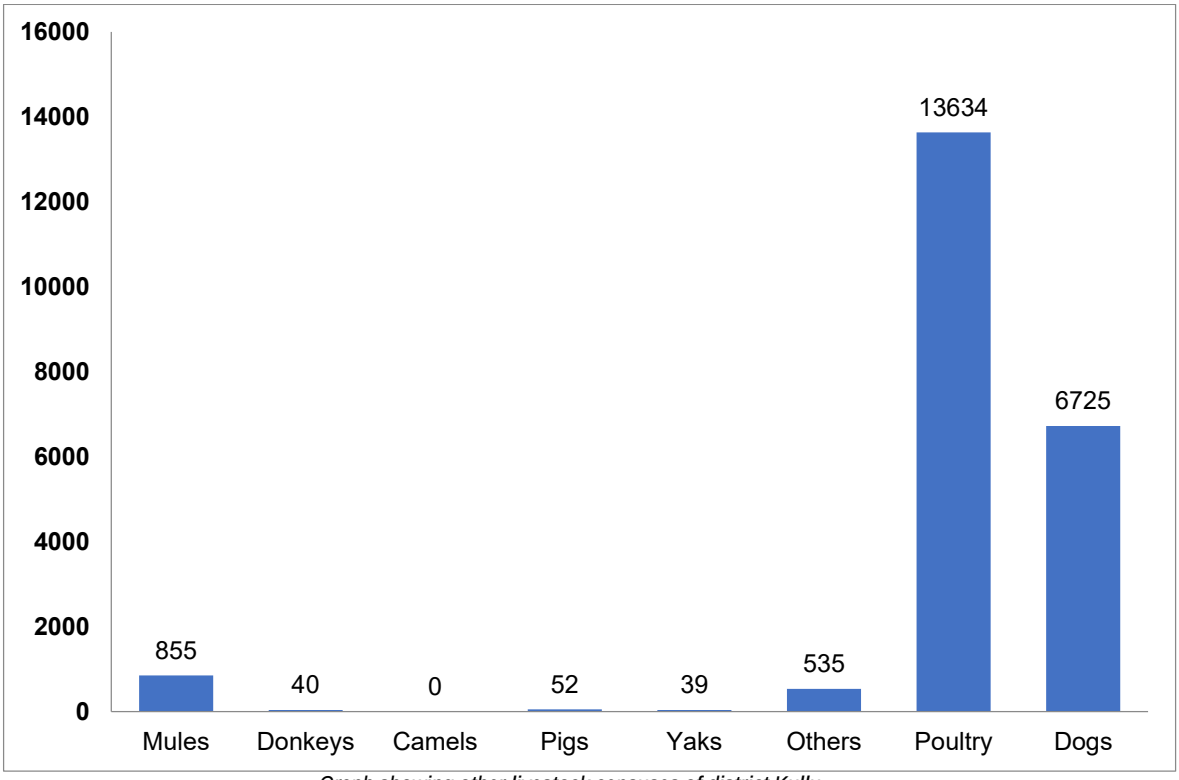


Graph showing livestock census of district Kullu

Table showing other Livestock Census in district Kullu

Other Livestock							
Mules	Donkeys	Camels	Pigs	Yaks	Others	Poultry	Dogs
855	40	…	52	39	535	13634	6725

Source: Directorate of Animal Husbandry, HP



Graph showing other livestock censuses of district Kullu

6.4 Fisheries

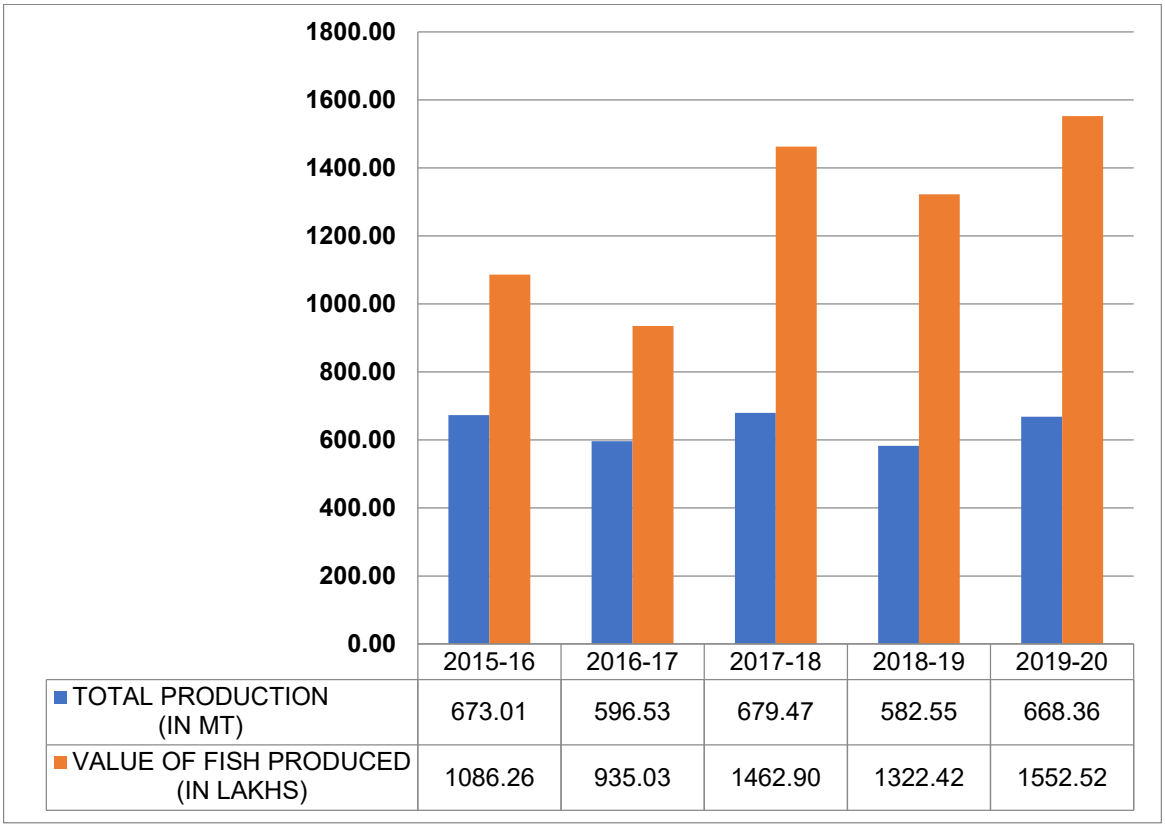
The Kullu District is blessed with vast and variegated fisheries resources in the vast network of perennial rivers, streams, Khads and fast-flowing cold waters, harbouring a wide variety of tropical species of fish. There is great potential for fish production in the district. The river system in the district constitutes river Beas and its tributaries, Uhl, Tirthan, Parvati etc. The total length for fishing in these waters in the district is around 462 Kilometres. These waters are inhabited by a variety of fish namely, SchyzpthoraxTorpilitora, Salmo trueta, salmogairdineri and weedy fishes. Fishing in this water is regulated by fisheries legislation under the Himachal Pradesh fisheries Act, 1976. As the site under question forms part of mountainous terrain there is no potential for fisheries. The fishery is not fully developed in the surrounding area also and individual fishing is practised to catch fish during the lean season. Low water temperature compels the fisheries to operate their net for a very short period. The inaccessible terrain is also one of the reasons for the lack of fisheries development in the region. Sizothorase Richardson and silver carp are the species observed in the region. High construction cost of raceways, costly seed & feed, lack of technical know-how and nonavailability of farm equipments and chemicals were reported to be the major constraints for the farmers to venture into this enterprise. Technical guidance, financial assistance and provision of farm equipments, chemicals, feed and seed locally at reasonable prices can render a boost to this sector.

The annual production is given in Table below

Table showing annual production of Fisheries and its value of catch in district

Table showing Annual Production of Fisheries at District Kullu		
YEAR WISE	TOTAL PRODUCTION (IN MT)	VALUE OF FISH PRODUCED (IN LAKHS)
2015-16	673.01	1086.26
2016-17	596.53	935.03
2017-18	679.47	1462.90
2018-19	582.55	1322.42
2019-20	668.36	1552.52

Source: Fisheries Department, HP



	2015-16	2016-17	2017-18	2018-19	2019-20
TOTAL PRODUCTION (IN MT)	673.01	596.53	679.47	582.55	668.36
VALUE OF FISH PRODUCED (IN LAKHS)	1086.26	935.03	1462.90	1322.42	1552.52

Graph showing annual production of Fisheries and its value of catch in district

6.5 Forest

According to the forest department, the total area under forests in the district is 4,95,169 hectares. The entire area is divided into six forest circles, namely, Kullu, Parvati, Banjar, Ani, Wild Animals and National Park, each having 19.5, 31, 5.29, 10.8, 9.69 and 23.72 per cent of the total forest area, respectively. Again, the forest area has been classified under three categories i.e. reserved forests, protected forests and unclassified forests. Reserve forests occupy 3.24 per cent of the area whereas protected forests occupy 64.8 per cent of the total area. Large-scale felling of trees, forest fires, theft, and overgrazing are the major factors resulting in the destruction and degradation of forests. The total value of medicinal herbs, resins and other forest products during 2002-03 amounted to Rs. 61 lakh.

The forest cover is visible along hill slopes, along river terraces scattered in patches or in strips on the banks of the streams as well as river banks on gravely and sandy loam soil. The Himalayan sub-tropical pine forests are observed between elevations 1000-2000 meters. Overlapping the tropical dry mixed deciduous forest at a lower elevation and giving way to temperate forests at a higher elevation. The Ban and Oak are the common and major species over the considerable area which varies from 1500 to 2100 meters. It thus overlaps the altitudinal zones of all the lower conifers and is commonly found in association with blue pine, Deodar, Ban, Oak, Forests occur at high elevations. The main associates are Rhododendron arboreuni, Lyonia, avalifolia and litseaumbora etc.

The following trees shrubs and grasses are found in the district:

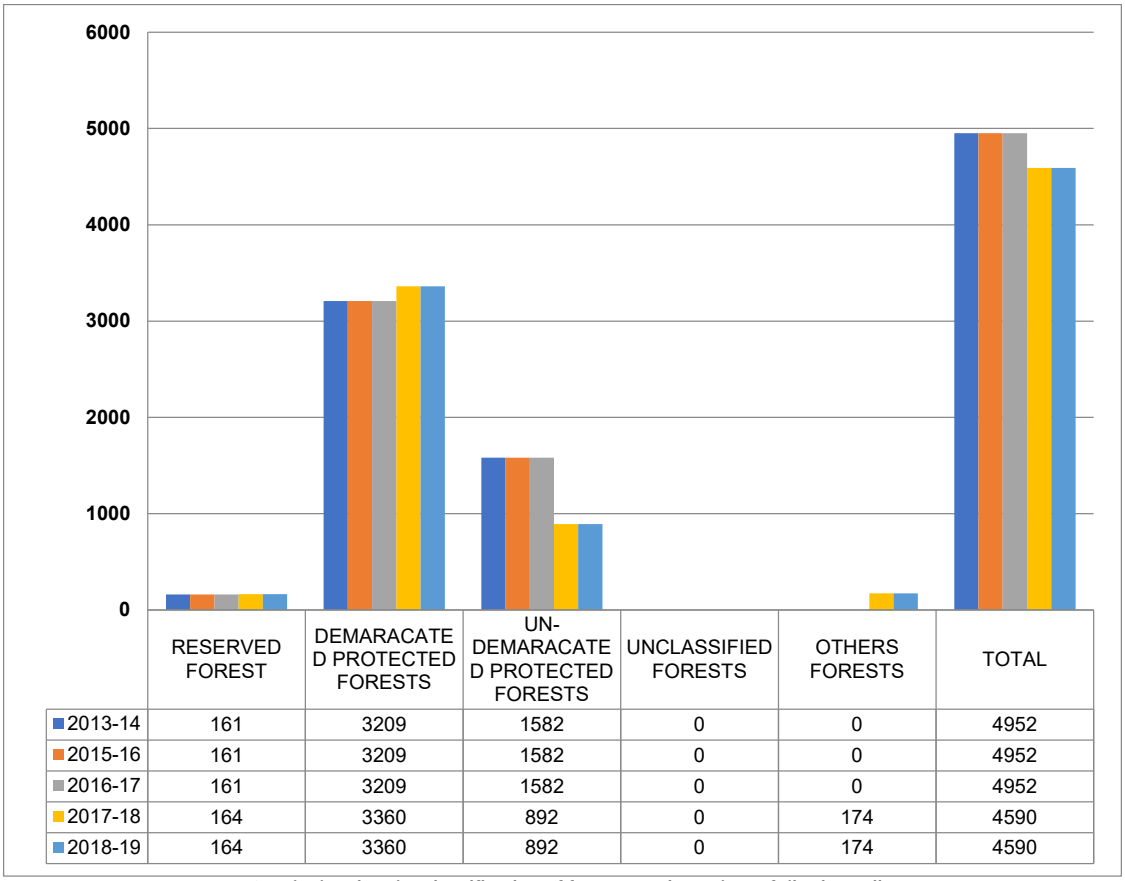
Sr. No.	Local Name	Sr. No.	Local Name
1	Tosh	14	Chil
2	Khair	15	Kail
3	Karyal	16	Chuli
4	Neem	17	Bashunti
5	Diar	18	Kashjmal

6	Galgal	19	Bharg
7	Nimbu	20	Kathi
8	Safeda	21	Timmer
9	Pipal	22	Tur
10	Akhrot	23	Akash bel
11	Amb	24	Baker bel
12	Kaphal	25	Pani bel
13	Rai	26	Dub

Table showing the classification of forest area (in sq.km.) of district

Classification of Forest Area (in sq km) of Kullu District						
YEAR	RESERVED FOREST	DEMARCATED PROTECTED FORESTS	UN-DEMARCATED PROTECTED FORESTS	UN-CLASSIFIED FORESTS	OTHERS FORESTS	TOTAL
2013-14	161	3209	1582	…	…	4952
2015-16	161	3209	1582	…	…	4952
2016-17	161	3209	1582	…	…	4952
2017-18	164	3360	892	…	174	4590
2018-19	164	3360	892	…	174	4590

Source: Forest Department, HP

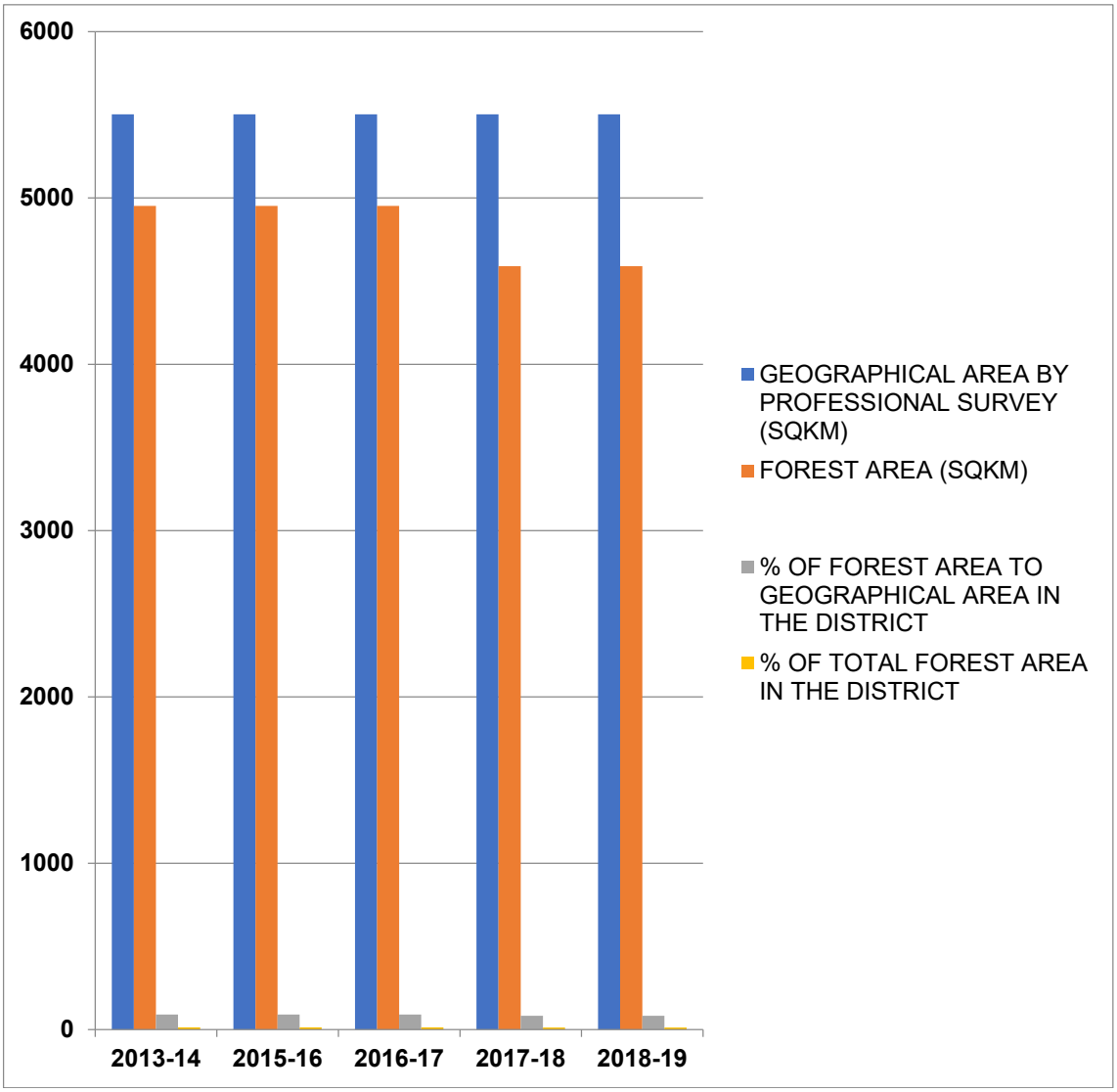


Graph showing the classification of forest area in sq. km. of district Kullu

Table showing forest area (in sq.km.) of district

Forest Area of Kullu District				
YEAR	GEOGRAPHICAL AREA BY PROFESSIONAL SURVEY (SQKM)	FOREST AREA (SQKM)	% OF FOREST AREA TO GEOGRAPHICAL AREA IN THE DISTRICT	% OF TOTAL FOREST AREA IN THE DISTRICT
2013-14	5503	4952	89.9	13.4
2015-16	5503	4952	89.9	13.4
2016-17	5503	4952	89.9	13.4
2017-18	5503	4590	83.41	12.1
2018-19	5503	4590	83.41	12.1

Source: Forest Department, HP



Graph showing geographical forest area in sq. km. of district Kullu

7. SURFACE WATER AND GROUND WATER SCENARIO OF THE DISTRICT

7.1 Surface Water

Rivers can be called as open as well as underground circulatory systems of a continent and in the case of the Kullu district of Himachal Pradesh River Beas and River Parvati 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.

7.2.1 MAJOR RIVERS OF KULLU DISTRICT

7.2.1.1 River Beas:

The Beas River rises in the Himalayas in central Himachal Pradesh, India, and flows for some 470 kilometres (290 mi) to the Sutlej River in the Indian state of Punjab. Its total length is 470 kilometres (290 mi) and its drainage basin is 20,303 square kilometres (7,839 sq mi) large. The river rises 4,361 metres (14,308 ft) above sea-level on the southern face of Rohtang Pass in Kullu district. It traverses the Mandi District and enters the Kangra District at Sandhol, 590 metres (1,940 ft) above sea-level. During its lower course the Beas is crossed by numerous ferries, many of which consist of inflated skins (darais). Near Reh in Kangra District it divides into three channels, which reunite after passing Mirthal, 300 metres (980 ft) above sea-level. On meeting the Sivalik Hills in Hoshiarpur, the river sweeps sharply northward, forming the boundary with Kangra District. Then bending round the base of the Sivalik Hills, it takes the southerly direction, separating the districts of Gurdaspur and Hoshiapur. After touching the Jullundur district for a short distance, the river forms the boundary between Amritsar and Kapurthala. Finally, the Beas joins the river Sutlej at the south-western boundary of Kapurthala district of Punjab after a total course of 470 kilometres (290 mi). The chief tributaries are Bain, Banganga, Luni and Uhal. The Sutlej continues into Pakistani Punjab and joins the Chenab River at Uch near Bahawalpur to form the Panjnad River; the latter in turn joins the Indus River at Mithankot. The waters of the Beas and Sutlej rivers are allocated to India under the Indus Waters Treaty between India and Pakistan.

7.2.1.2 Parvati River

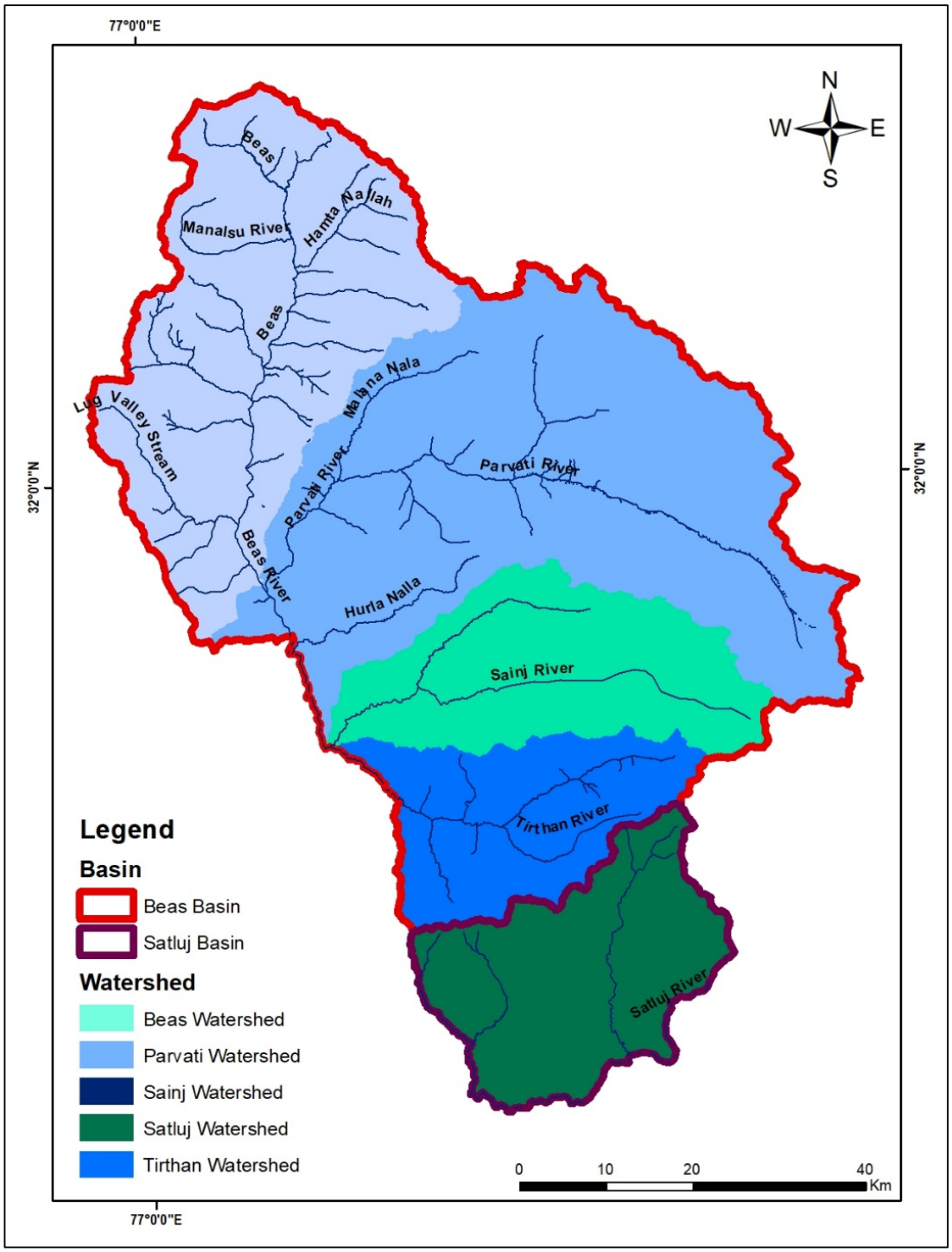
Parvati River is a river in the Parvati Valley in Himachal Pradesh, northern India that flows into the Beas River at Bhuntar, some 10 km south of Kullu. It rises from the Man Talai Glacier below the Pin Parbati pass and flows in a gradual curve from north-northwest to west-southwest past the important temple town of Manikaran.

The river valley has been a route to various places: Lahul across the Sara Umga La pass, Spiti across the famous Pin Parbati pass, and the recently discovered (1995) Debsa Pass. The river has fine first-growth forests in its upper reaches which are being degraded as a consequence of development of its vast hydro-electric potential. There are geothermal springs on the banks of the river at Manikaran and Khirganga.

Parvati River has Pandav Nalaha, Tosh Nalaha, Manikaran Nalaha and Malana Nalaha as major tributaries on the right side and KalgaNalaha, Sar Nalaha, Grahan Nalaha, Shat Nalaha and Charraur Nalaha on the left side.

7.2.1.3 Sainj and Tirthan rivers

The Sainj valley and the Tirthan valley are two sister valleys in the Kullu region. The route to Sainj is via Kullu and then on to Larji after passing close by Aut. The region is thick with forest as there have not been much of manmade projects unlike what has happened in most other similar regions. Yet, between the Sainj and the Tirthan valleys, the Sainj has suffered somewhat more than the Tirthan due unplanned projects launched for hydroelectric power generation in the Sainj valley and stream. Sainj is some 35 km by road from Kullu. The scenic beauty of the surrounding would sure capture any tourist's heart while travelling towards their destination. The distinction between the Sainj and the Tirthan, which starts from the same glacier and then ends up at the Beas at the same spot also, after travelling their own separate routes, is the colour of the water. The Sainj River has water that is silty and muddy in appearance while the Tristan has clear and green tinted water flowing in it.



The Sainj River has further smaller tributaries namely Parkachi Thach nala, Shansher Nala, and Seund Nala on the right side and Shangarh Nala on the left bank. Similar to the Tirthan River has Ghushaini Nala and Shapnil Nala on the right side and Shoja Nala/Stream, Banjar khad and Manglor Khad on the left side. Apart from these tributaries, the Beas River has SolangNalaha, Old nala, FozalNalaha, SarvariNalaha and MohalKhad on the right side and PalchanNalaha, JagatSukhNalaha, and AleoNalaha on the left side.

7.2 Groundwater

Hydro geologically the entire area of Kullu district can be divided into porous and fissured formations. Porous formation includes the unconsolidated sediments. These sediments include fluvial channel deposits, valley-fill deposits, terrace deposits and alluvial fans. These sediments form the potential aquifers. Unconsolidated sediments underlie Kullu valley, Garsa valley, Manikaran valley, Lag valley and longitudinal valley all along the major rivers and khads. Fissured formation includes the semi-consolidated to consolidated sediments exposed in the district and are of sedimentary, metamorphic and igneous in origin. This forms low to high hill ranges throughout the district. In Kullu valley, ground water generally occurs under confined to semiconfined conditions. Phreatic aquifers are tapped mainly by open wells and form a major source of domestic and irrigation water supply in the valley area. The aquifer zone mainly comprises of sand and silt in association with pebbles and boulders in low plains and predominantly boulders, cobbles and pebbles mixed with little clay in terraces. Static water level varies from 1.62m to 31.45m below ground level.

Central Ground Water Board has drilled 9 wells including observation wells in the district to know the aquifer parameters and sub-surface geology. The discharge of these wells varies from 299 lpm to 1079 lpm. The source of major water supply schemes is based on springs in the district. The discharge of the springs varies from 0.5 lps to 25 lps. The majority of the springs are gravity springs. In gravity springs, the most common are the contact springs, which are formed by permeable water-bearing formations overlying less permeable formations the contact of these formations intersects the ground surface. There are lots of hot springs in Kullu and Parvati valleys. Along Beas River Valley hot springs vary in temperature from 29^{o}C to 59^{o}C and in Parbati River Valley the thermal springs vary in temperature from 35^{o}C to 96^{o}C. In Beas River valley, all the rocks belong to the Pre-Cambrian age and are represented by gneisses, phyllites, quartzite and limestones. A major fault extending in a north-south direction from Bashist to Katrain for a distance of 25 kms, appears to control the emergence of thermal activity.

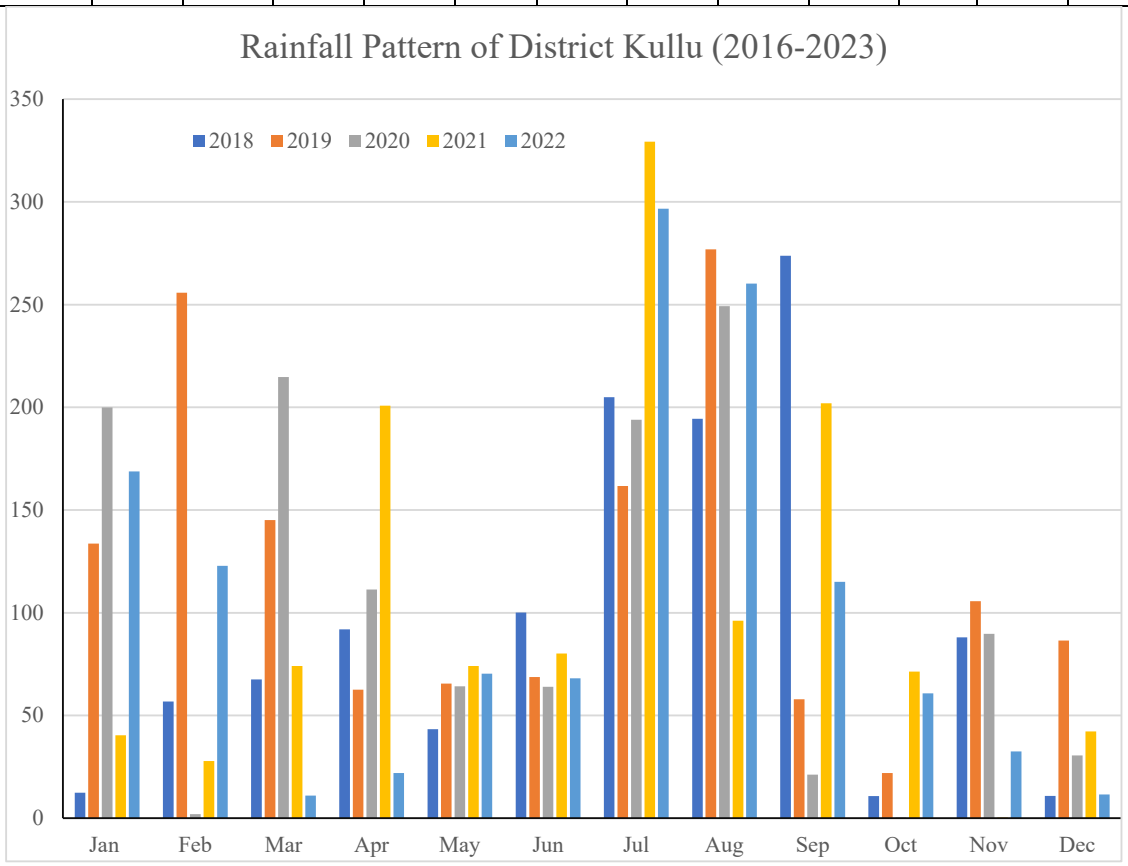
8. Rainfall of the district and climatic condition

District Kullu, situated in the state of Himachal Pradesh, India, experiences a diverse climate owing to its location in the Himalayan region. The rainfall pattern in Kullu is primarily influenced by the monsoon winds that sweep across the Indian subcontinent. The monsoon season, which typically occurs from June to September, brings the majority of the annual precipitation to the region. During the monsoon months, Kullu witnesses moderate to heavy rainfall, transforming the landscape into a lush green paradise. The rainfall is vital for sustaining the rich biodiversity and supporting agricultural activities in the region. The moisture-laden winds from the Bay of Bengal bring abundant rainfall to the Himalayan foothills, contributing to the fertility of the soil and facilitating the cultivation of various crops, including apples, plums, and other fruits for which the region is renowned.

The topography of Kullu, characterized by its valleys and mountains, can influence the distribution of rainfall within the district. The southern and western parts of Kullu, closer to the main Himalayan range, might receive more precipitation compared to the northern areas. It's important to note that the climate and rainfall trends can vary from year to year due to factors such as the Indian Ocean Dipole, El Niño, or La Niña events, which impact the monsoon patterns.

Though the months of July and August, 2023 also witnessed floods but no substantial damage was caused by these floods. It was in the first week of September, 1995 when the entire State had heavy rains that district Kullu witnessed heavy floods particularly between 2nd to 5th September, 1995. The intensity of floods was very high throughout the district. It has been observed that large scales of River borne material has been deposited along the nala due to flash floods and changes the course of water due to the deposition of RBM terraces at the centre of the river. Also due to deposition of debris at the centre of the nala, erosion has started along the banks of the river which leads to change the course of river many times. In some cases, water flowing along the banks results in the undercutting of the slopes by a river. This undercutting serves both to increase the gradient of the slope, reducing stability, and to remove toe weighting, which also causes heavy landslides. The average monthly rainfall in the Kullu district during the years 2018 to 2022 is as follows.

YEAR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	12.4	56.8	67.5	91.9	43.3	100.1	204.9	194.4	273.8	10.7	88	10.9
2019	133.7	255.8	145.1	62.5	65.5	68.7	161.7	276.9	57.9	22	105.6	86.5
2020	199.9	1.9	214.7	111.3	64.2	63.9	194	249.2	21.2	0.3	89.7	30.6
2021	40.3	27.8	74.1	200.8	74.1	80.2	329.3	96.2	202	71.3	0.3	42.2
2022	168.8	122.8	11	22	70.4	68.1	296.7	260.2	115.1	60.8	32.5	11.5



Graph showing Monthly rainfall data of the district Kullu

9. Details of the mining leases in the District

Mining Leases in the District Mandi with location, area and Status

Sr. No	Name & Address of Leases	Khasra No./Location (in Mauza, Mohal)	Area (Hectares/ Bighas)	Location/ Co- ordinates of Leases
1.	Sh. Sangat Ram S/o Sh. Chimmnu Ram , Village Moin, P.O. Nirath, Sub-Tehsil Nether, Distt. Kullu H.P.	Khsra No. 2565/1 & 5724/2552/1	04-13 Bighas Pvt Land	77°30' 17.12" E 77°30'18.72" E 31°21'18"N 31°21'16.4"N
2.	Sh. Prabhu Dyal S/o Sh. Thakur Dass , Village Moin, P.O. Nirath, Sub-Tehsil Nether, Distt. Kullu H.P.	Khasra No. 2329,2368, 2369/1,2369/2, 2370 & 2369/3	06-02-00 Bighas Pvt Land	77°30' 17" E 77°30'17.69" E 31°21'08"N 31°21'1.96"N
3.	Sh. Harish Goswami S/o Sh. Bal Mukund , V. P.O. Koil, Sub-Tehsil Nirmand, Distt. Kullu H.P.	Khsara No. 1315 & 1322	07-01-00 Bighas Pvt Land	77°33' 51" E 77°33'47" E 31°23'39"N 31°23'37.4"N
4.	Sh. Ashok Kumar S/o Shyam Lal, Village Moin, Tehsil Neether, Distt. Kullu	Kh. No. 2528	03-05 Bighas	77°30' 16.7" E 77°30'19.75" E 31°21'8.60"N31°21'7.30"N
5.	M/s SJVNL ,Luhri Hydro-Electric Project , Bithal P.O. Samathla, Tehsil Kumarsain Distt. Shimla H.P.	Kh. no. 2606,2607, 2610, 2611, 2617, 2618 to 2625 (Pvt Land) and Tukra No.7 Govt. Land	04-67 Hectare Mauza	77°31' 12.8" E 77°21'16.1" E 31°21'7.60"N 31°21'18.7"N
6.	M/s SJVNL, Luhri Hydro-Electric Project, Bithal P.O. Samathla, Tehsil Kumarsain Distt. Shimla H.P.	Tukra No.-2(Govt. Land)	03-81-44 Hectare	77°33' 52.8" E 77°33'58" E 31°23'35.20"N 31°23'24.44"N
7.	Sh. Rakesh Verma S/o Late Sh. Bansi Lal Verma ,Village Bashong ,P.O. Sariun ,Tehsil Theog, Distt. Shimla, H.P.	Kh. No. 2630,2632,2633 &2634 Mauza/Mohal Neether, Tehsil Nirmand,	Totaling 10-07-00 bighas (Pvt. Land)	77°51'75.6" E 77°51'86.7" E 31°35'47.90"N 31°35'44"N
8.	Sh. Subhash Sharma, Village Rewari, P.O. Dalash, Tehsil Neether, Distt. Kullu H.P.	Kh.No.457,2458,2459,2460/1, 2478 , Mauza/Mohal Neether, Tehsil Nirmand.	07-12 bighas Pvt. Land	77°30' 22" E 77°30'26.76" E 31°20'58.65"N 31°20'58.96"N
9.	Naresh Kumar S/o Late Sh. Bala Ram ,Village Moin, PO Nerath, Sub-Tehsil Nither ,.Distt. kuulu H.P.	Kh. no. 2564,2566,2560 &2561 Mauza/Mohal Neether, Tehsil Nirmand	08-18 Bighas	77°30' 17" E 77°30'17.69" E 31°21'08"N 31°21'1.96"N
10.	Virender Kumar S/o Jia Lal village Jamedi, P.O. Luhri, Tehsil Anni, Distt. Kullu, H.P.	Kh. No. 552	03-11-0 Bighas	77°25' 41.93" E 77°25'43.70" E 31°20'59.73"N 31°20'1.84"N
11.	Bhoop Singh S/o Amar Chand Village Gagni P.O. Arsu, Tehsil, Nirmand, Distt. Kullu, H.P.	Kh. No. 1321	04-07 Bighas	77°33' 38.00" E 77°33'34.11" E 31°23'47.40"N 31°23'46.80"N
12.	Veer Singh S/o Salig Ram Village Chiyuni Moin , Po Nerath, Sub-Tehsil Nither ,Distt. Kullu, H.P.	Kh. No. 2637 and 2640	06-05 Bigha	77°31' 04.31" E 77°31'12.61" E 31°21'14.66"N 31°21'13.08"N

13.	Jitender Kumar Ram Village Gaura , PO Durah, Sub-Tehsil Nither ,Distt. Kullu, H.P.	Kh. No.2502/2 2504, 2505,2506	07-06 Bigha	77°30' 14.3" E 31°21'02.4"N
14.	Sh. Atul Sharma S/o Sh. M.D. Sharma, Vill. Sainj, P.O. Kirti, Tehsil Kumarsain, Distt. Shimla, H.P.	Kh.No.2643,2642,2641/2,2635/1,2641/1, 2645,2646/1,2635/3,2635/2 & 2646/2	20-11 Bighas	77°23' 30.5" E 77°23'21.8" E 31°21'22.60"N 31°21'21.5"N
15.	Sh. Rakesh Verma S/o Late Sh. Bansi Lal Verma ,Village Bashong ,P.O. Sariun ,Tehsil Theog, Distt. Shimla, H.P.	Kh. No. 2626/1,2627,2628 &2629 Mauza/Mohal Neether, Tehsil Nirmand,	Totaling 08-02-00 bighas (Pvt. Land)	77°31'4.07" E 77°31'4.11" E 31°21'13.74"N 31°21'14.06"N
16	Sh. Sher Singh S/o Sh. Nandu Ram Prop. M/s Chaturbhuja Stone Crusher, Vill. Tharas PO Hurla Tehsil Bhunter Distt. Kullu, H.P.	Kh. No. 4334, 4412,4337 & 4585/2320 Maua/ Mohal Bhallan Rot-II , Tehsil Bhunter, Distt. Kullu H.P.	8-13 Bighas (Pvt. Land)	77°11' 58" E 77°12'0.01" E 31°47'15.20"N 31°47'10.44"N
17	Sh. Ravinder Kumar Gupta, Vill. Jauni Ropa, PO Neoli, Tehsil & Distt. Kullu, H.P.	Kh. No. 3827/3599/3104/2	19-00-00 Bighas	77°10' 43.86" E 77°10'42.3" E 31°50'37.04"N 31°50'38.07"N
18	Sh. Sher Singh S/o Sh. Nandu Ram Prop. M/s Chaturbhuja Stone Crusher, Vill. Tharas PO Hurla Tehsil Bhunter Distt. Kullu, H.P.	Kh. No. 4217/2266, 4218/2266, Maua/ Mohal Bhallan Rot-II , Tehsil Bhunter, Distt. Kullu H.P.	6-14 Bighas (Pvt. Land)	77°11' 55" E 31°47'6"N
19	Sh. Om Prakash Sharma S/o Sh. Jyoti Prakash, Vill. Near New Bridge Parla Bhunter Tehsil Bhunter, Distt. Kullu, H.P.	Tukra No. 1 ,Mauza Chaunti Bihal, Phati Dayar, Kothi-Kot Kandi, Tehsil Bhunter, Distt. Kullu.	13-14-10 Bighas	77°10' 56" E 77°11'59.2" E 31°51'38.5"N 31°51'40"N
20	M/s NHPC PHEP, Stage-II ,Nagwain ,Tehsil Aut Distt. Mandi H.P.	Khasra No. 4745/2	13-00-00 Bighas	77°11' 38.8" E 77°11'38.10" E 31°50'07.9"N 31°47'9.24"N
21	Sh. Rajender Singh M/s Ashapuri St.Cr.VPO Hurla,Tehsil Bhunrter Distt. Kullu H.P.	Khasra No. 2888/2567/2	21-03-12 bighas	77°13' 31.09" E 77°13'36.00" E 31°51'11.10"N 31°51'09.7"N
22	Sh. Vikas Sohal Prop:M/s Himalyan Stone crusher,Village Bhatgran, PO Pepalage,Tehsil Bhunter,Distt. Kullu H.P.	Kh. No. 2882, 3669/1, 3670/1 &3671/1	16-19-07 bighas	77°11' 02.5" E 77°11'1.71" E 31°51'40.00"N 31°51'33.94"N
23	Sh. Rajesh Kumar ,Village Tikoli ,P.O. Panarsa, Tehsil Aut, Distt. Mandi H.P.	Kh. No. 5377/2	14-00-00 Bighas	77°11' 50.88" E 77°11'51.02" E 31°48'12.84"N 31°48'08.07"N
24	Sh. Hiteshwar Singh S/o Maheshwar Singh Prop: M/s Drishti St. Cr. VPO Hurla, Tehsil Bhunter Distt. Kullu,H.P.	Kh. No. 2935/1	10-00 Bighas	77°10' 53.9" E 77°10'47.3" E 31°51'04.10"N 31°51'02.7"N
25	Sh. Abhishek Thakur Prop. M/s Murari Mata St. Cr. V.P.O. Larji, Tehsil Balichowki, Distt. Mandi. H.P.	Tukra No. –I . Distt. Kullu H.P.	Diverted Forest Land 29-15 Bighas.	77°14' 5" E 31°44'11.64"N
26	Thakur Dass S/o Paras Ram Village Maraur, P.O. Panihar, Tehsil Banjar, Distt. Kullu, H.P.	Kh. No.903/683, 904/683 &909/683 (Pvt.Land)	09-10-00 Bighas	77°19' 2.82" E 77°19'02.00" E 31°42'34.12"N 31°42'31.75"N

27	Sh. Atul Sharma S/o Sh. M.D. Sharma, Vill. Sainj, P.O. Kirti, Tehsil Kumarsain, Distt. Shimla, H.P.	2643,2642,2641/2,2635/1, 2641/1/2645,2646/1,2635/3 and 2635/2	20-11 Bighas.	77°10' 57.25" E 77°10'154.01" E 31°51'35.23"N 31°51'38.89"N
28	Sh. Rajender Singh M/s Ashapuri St.Cr.VPO Hurla,Tehsil Bhunrter Distt. Kullu H.P.	Khasra No. 3049 Mauza Diyar	12-10 -00 bighas	77°17' 17.07" E 77°17'18.86" E 31°45'05.93"N 31°45'03.38"N
29	Sh. Kuldeep Chand Village Niyahi, P.O. Kanaun, Tehsil Sainj, Distt. Kullu, H.P.	Kh. No 2417 Mauza Mohal Dhaugi Kothi Bunga	Measuring 05-01 Bighas	77°30' 24.30" E 77°30'23.46" E 31°21'09.07"N 31°21'10.709"N
30	Sanjay Kumar S/o Ram Swaroop Village Shawad Mandar, P.O. Shawad, Tehsil Anni ,Distt. Kullu,H.P.	Kh No 2416,2420,and 2421 m	05-14 Bighas	77°30' 13.3" E 77°30'13.60" E 31°21'16.40"N 31°21'15.75"N
31.	Sh. Atul Sharma S/o Sh. M.D. Sharma, Vill. Sainj, P.O. Kirti, Tehsil Kumarsain, Distt. Shimla, H.P.	Kh.No.6250/5724/2552 &6252/25652	04-11 Bighas	77°13' 57.78" E 77°13'56.35" E 31°44'14.09"N 31°44'11.31"N

10. Details of Royalty or Revenue received in last Five years

Details of Royalty or Revenue received in the last Five years				
FY	Details of Royalty	Details of DMFT	Expenditure	No. of Project sanctioned
2018-19	3,91,43,359	12,51,167/-	Nil	Nil
2019-20	7,19,50,353	6,46,380/-	nil	nil
2020-21	10,61,27,093/-	16,38,383/-	Nil	Nil
2021-22	4,83,82,531/-	18,82,209/-	nil	nil
2022-23	9,22,25,847/-	21,97,337/-	3,68,163/-	10

11. Details of Production of Minor Mineral in last Five years;

Detail of Production of Sand or Bajri or minor mineral in last Five years				
FY	Boulders	Aggregate	Sand	slate
2018-19	732410	nil	nil	nil
2019-20	421762	nil	5683	nil
2020-21	488274	nil	1100	nil
2021-22	488526	52850	11954	nil
2022-23	856012	25341	55826	nil

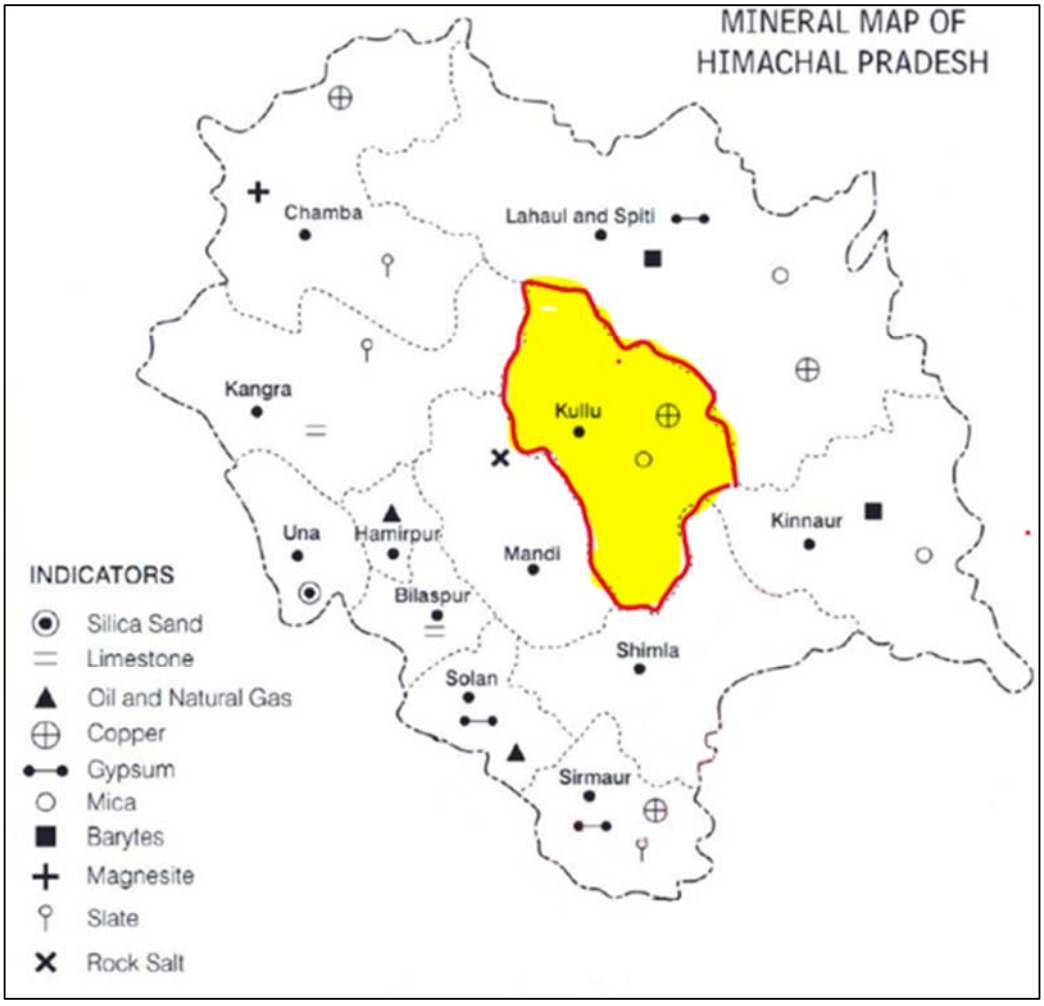
Detail of Production of Stone, Slate, Cut stone or other minor mineral in last three years				
FY	Slate/Rough slab slate	Rough Stone	Cut Stone	Other Minor Mineral
2018-19	1038	nil	nil	nil
2019-20	1266	nil	nil	nil
2020-21	543	nil	nil	nil
2021-22	1004	nil	nil	nil
2022-23	nil	nil	nil	nil

12. Mineral Map of the District:

There is no major mineral available in the district. From the geological report, it appears that there are some deposits of various minerals of non-commercial uses that are available in this district are purple limestone, dolomite, Coal, Beryl bearing pegmatites, Sulphur deposits, China clay, Bands of hematite–-quartzite, Traces of nickel and cobalt etc and it is difficult to say whether a large-scale industrial development is possible. Hence on the basis of available minerals no major industrial enterprises can be set up in the district.

The minor minerals available in the district are sand, clay, slate and Rough Stone/Project Stone. A good quality of slates(suitable for roofing, paving and fencing), sandstone and quartzite etc. (for Manufacturing of Gritamd M-sand) are available in the district.

Limestone: - It is the most important mineral of the state which is also found in abundance.and used in the manufacturing of cement, chemicals, fertiliser, paper and leather industries. 80% of the mineral production in the state consists of limestone. It is mainly found in Barmana (Bilaspur), Gagal (Kangra), Solan, Mandi, Chamba (Broh, Sindh, Dhundiara), Kinnaur, Kullu and Shimla districts. Limestone deposits are also found in Sirmaur district in three regions.



Slate: - The state has high-quality slate stone and is the leading producer of slate in the country. This mining is done for the fulfilment of the local needs. A factory is established in Mandi for the manufacturing of slate tiles which has great demand in the country and the world. This demand created

possibility for the development of other factories in the region. Slate is mainly found in Chamba, Sirmaur, and Khaniara Kangra district.

Radioactive Minerals: -Evidence of radioactive rocks have been found in Kullu, Kinnaur, Hamirpur and Shimla regions. Banjar town near Chhinjara and Jari region of Parvati valley shows the possibility for the availability of such minerals as in Dhela of Garash valley.

Mineral Water: - It is found in Bilaspur, Solan, Kangra and Shimla. Kalath village is famous the world over for mineral water. In Manali region of Kullu district natural mineral water resources are found that contains sodium, magnesium, calcium chloride, sulphates.

13. List of Letter of Intent (LOI) Holders in the District along with its validity

It is submitted that the department grants mineral concessions in two modes, one through auction and another through mining leases. Further, letter of Intent (LoI) are issued to the applicants by the competent authorities only after recommendations of the Joint Inspection Committee which is a continuous process. for completion of other codal formalities, such as, obtaining the Forest Clearence, Environment Clearence and Mining plan etc. In such a manner, the letter of intent get matured for the grant of the mining lease only after the submission of clearances as mentioned in the conditions of letter of Intent (LoI. As such, it is an ongoing process and as soon as the clearances are obtained, the letters of intent are converted into a mining lease. Also, if the letter of intent holder is unable to obtain the required statutory clearances within the validity period of the 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 intent in this survey document (DSR) as these keep on changing on a day-to-day basis.

Mining Leases in the District Mandi with location, area and period of validity

Sr.No	Name & Address of Leases	Khasra No./Location (in Mauza, Mohal)	Area (Hectares/ Bighas)	Period in Years
1.	Sh. Sangat Ram S/o Sh. Chim mnu Ram , Village Moin, P.O. Nirath, Sub-Tehsil Nether, Distt. Kullu H.P.	Khsra No. 2565/1 & 5724/2552/1	04-13 Bighas Pvt Land	28-11-2020 For 05 years
2.	Sh. Prabhu Dyal S/o Sh. Thakur Dass , Village Moin, P.O. Nirath, Sub-Tehsil Nether, Distt. Kullu H.P.	Khasra No. 2329,2368,2369/1, 2369/2, 2370 & 2369/3	06-02-00 Bighas Pvt Land	21-02-2020 For 05 years
3.	Sh. Harish Goswami S/o Sh. Bal Mukund , V. P.O. Koil, Sub-Tehsil Nirmand, Distt. Kullu H.P.	Khsara No. 1315 & 1322	07-01-00 Bighas Pvt Land	20-11-2020 For 10 years
4.	Sh. Ashok Kumar S/o Shyam Lal, Village Moin, Tehsil Neether, Distt. Kullu	Kh. No. 2528	03-05 Bighas	6-03-2021
5.	M/s SJVNL ,Luhri Hydro-Electric Project , Bithal P.O. Samathla, Tehsil Kumarsain Distt. Shimla H.P.	Kh. no. 2606,2607, 2610, 2611, 2617, 2618 to 2625 (Pvt Land) and Tukra No.7 Govt. Land	04-67 Hectare Mauza	17/09/2021
6.	M/s SJVNL, Luhri Hydro-Electric Project, Bithal P.O. Samathla, Tehsil Kumarsain Distt. Shimla H.P.	Tukra No.-2(Govt. Land)	03-81-44 Hectare	17/09/2021

7.	Sh. Rakesh Verma S/o Late Sh. Bansi Lal Verma ,Village Bashong ,P.O. Sariun ,Tehsil Theog, Distt. Shimla, H.P.	Kh. No. 2630,2632,2633 &2634 Mauza/Mohal Neether, Tehsil Nirmand,	Totaling 10-07-00 bighas (Pvt. Land)	29/08/2022 for ten years
8.	Sh. Subhash Sharma, Village Rewari, P.O. Dalash, Tehsil Neether, Distt. Kullu H.P.	Kh.No.457,2458,2459,2460/1,2478 , Mauza/Mohal Neether, Tehsil Nirmand.	07-12 bighas Pvt. Land	19/07/2022
9.	Naresh Kumar S/o Late Sh. Bala Ram ,Village Moin, PO Nerath, Sub-Tehsil Nither ,.Distt. kuulu H.P.	Kh. no. 2564,2566,2560 &2561 Mauza/Mohal Neether, Tehsil Nirmand	08-18 Bighas	18/11/2021 for five years
10.	Virender Kumar S/o Jia Lal village Jamedi, P.O. Luhri, Tehsil Anni, Distt. Kullu, H.P.	Kh. No. 552	03-11-0 Bighas	20/04/2023 for five years
11.	Bhoop Singh S/o Amar Chand Village Gagni P.O. Arsu, Tehsil, Nirmand, Distt. Kullu, H.P.	Kh. No. 1321	04-07 Bighas	03/05/2023 for five years
12.	Veer Singh S/o Salig Ram Village Chiyuni Moin , Po Nerath, Sub-Tehsil Nither ,Distt. Kullu, H.P.	Kh. No. 2637 and 2640	06-05 Bigha	14/06/2023 for five years
13.	Jitender Kumar Ram Village Gaura , PO Durah, Sub-Tehsil Nither ,Distt. Kullu, H.P.	Kh. No.2502/2 2504, 2505,2506	07-06 Bigha	01/06/2023
14.	Sh. Atul Sharma S/o Sh. M.D. Sharma, Vill. Sainj, P.O. Kirti, Tehsil Kumarsain, Distt. Shimla, H.P.	Kh.No.2643,2642, 2641/2,2635/1,2641/1,2645, 2646/1,2635/3,2635/2 & 2646/2	20-11 Bighas	01-08-2023 for 5 Years
15.	Sh. Rakesh Verma S/o Late Sh. Bansi Lal Verma ,Village Bashong ,P.O. Sariun ,Tehsil Theog, Distt. Shimla, H.P.	Kh. No. 2626/1,2627,2628 &2629 Mauza/Mohal Neether, Tehsil Nirmand,	Totaling 08-02-00 bighas (Pvt. Land)	16/11/2023 for five years
16	Sh. Sher Singh S/o Sh. Nandu Ram Prop. M/s Chaturbhuja Stone Crusher, Vill. Tharas PO Hurla Tehsil Bhunter Distt. Kullu, H.P.	Kh. No. 4334, 4412,4337 & 4585/2320 Maua/ Mohal Bhallan Rot-II , Tehsil Bhunter, Distt. Kullu H.P.	8-13 Bighas (Pvt. Land)	16-03-2020 for 10 years
17	Sh. Ravinder Kumar Gupta, Vill. Jauni Ropa, PO Neoli, Tehsil & Distt. Kullu, H.P.	Kh. No. 3827/3599/3104/2	19-00-00 Bighas	14-12-2020 for 05 years
18	Sh. Sher Singh S/o Sh. Nandu Ram Prop. M/s Chaturbhuja Stone Crusher, Vill. Tharas PO Hurla Tehsil Bhunter Distt. Kullu, H.P.	Kh. No. 4217/2266, 4218/2266, Maua/ Mohal Bhallan Rot-II , Tehsil Bhunter, Distt. Kullu H.P.	6-14 Bighas (Pvt. Land)	16-03-2020 for 10 years
19	Sh. Om Prakash Sharma S/o Sh. Jyoti Prakash, Vill. Near New Bridge Parla Bhunter Tehsil Bhunter, Distt. Kullu, H.P.	Tukra No. 1 ,Mauza Chaunti Bihal, Phati Dayar, Kothi-Kot Kandi, Tehsil Bhunter, Distt. Kullu.	13-14-10 Bighas	01-02-2021 for 15 years
20	M/s NHPC PHEP, Stage-II , Nagwain , Tehsil Aut Distt. Mandi H.P.	Khasra No. 4745/2	13-00-00 Bighas	5 years
21	Sh. Rajender Singh M/s Ashapuri St.Cr.VPO Hurla,Tehsil Bhunrter Distt. Kullu H.P.	Khasra No. 2888/2567/2	21-03-12 bighas	5 years w.e.f.03/02/2022 to 02/02/2027

22	Sh. Vikas Sohal Prop:M/s Himalyan Stone crusher,Village Bhatgran, PO Pepalage,Tehsil Bhunter,Distt. Kullu H.P.	Kh. No. 2882, 3669/1, 3670/1 &3671/1	16-19-07 bighas	23/05/2022 For five year
23	Sh. Rajesh Kumar ,Village Tikoli ,P.O. Panarsa, Tehsil Aut, Distt. Mandi H.P.	Kh. No. 5377/2	14-00-00 Bighas	11/03/2022 Five years
24	Sh. Hiteshwar Singh S/o Maheshwar Singh Prop: M/s Drishti St. Cr. VPO Hurla, Tehsil Bhunter Distt. Kullu,H.P.	Kh. No. 2935/1	10-00 Bighas	13/09/2022
25	Sh. Abhishek Thakur Prop. M/s Murari Mata St. Cr. V.P.O. Larji, Tehsil Balichowki, Distt. Mandi. H.P.	Tukra No. –l . Distt. Kullu H.P.	Diverted Forest Land 29-15 Bighas.	01/02/2021 for 15 years
26	Thakur Dass S/o Paras Ram Village Maraur, P.O. Panihar, Tehsil Banjar, Distt. Kullu, H.P.	Kh. No.903/683, 904/683 &909/683 (Pvt.Land)	09-10-00 Bighas	12/04/2023
27	Sh. Atul Sharma S/o Sh. M.D. Sharma, Vill. Sainj, P.O. Kirti, Tehsil Kumarsain, Distt. Shimla, H.P.	2643,2642,2641/2, 2635/1,2641/1/2645, 2646/1,2635/3 and 2635/2	20-11 Bighas.	01-08-2023 for 5 Years
28	Sh. Rajender Singh M/s Ashapuri St.Cr.VPO Hurla,Tehsil Bhunrter Distt. Kullu H.P.	Khasra No. 3049 Mauza Diyar	12-10 -00 bighas	5 years w.e.f.03/02/2022 to 02/02/2027
29	Sh. Kuldeep Chand Village Niyahi, P.O. Kanaun, Tehsil Sainj, Distt. Kullu, H.P.	Kh. No 2417 Mauza Mohal Dhaugi Kothi Bunga	Measuring 05-01 Bighas	01/112023 to 31/10/2028
30	Sanjay Kumar S/o Ram Swaroop Village Shawad Mandar, P.O. Shawad, Tehsil Anni ,Distt. Kullu,H.P.	Kh No 2416,2420,and 2421 m	05-14 Bighas	07/03/2024 to 06/03/2029
31.	Sh. Atul Sharma S/o Sh. M.D. Sharma, Vill. Sainj, P.O. Kirti, Tehsil Kumarsain, Distt. Shimla, H.P.	Kh.No.6250/5724/2552 & 6252/25652	04-11 Bighas	07-03-2024 for 5 Years

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 (28 registered mining leases) mining operations is being carried out to produce stone/slate mining in the district. However, there are 28 Nos of potential stone deposits have been identified in Distt. Kullu, H.P.

15. Quality /Grade of Mineral available in the district: -

The rock formations in the Kullu District are of the Banjar series with associated basic rocks; the Larji Series and the Chail Series. A major part of the area consists of the rocks of the Banjar Series most of which farms the peaks and higher ranges of hills. The rocks of the Larji series are at lower levels. The contacts of the above-mentioned rock formations are marked by two thrusts. 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 good quality thick bands of slates which is suitable for roofing, paving and fencing purposes occur in Kullu District. 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 sector is going on. Stone and sand are the basic requirement 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 28 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

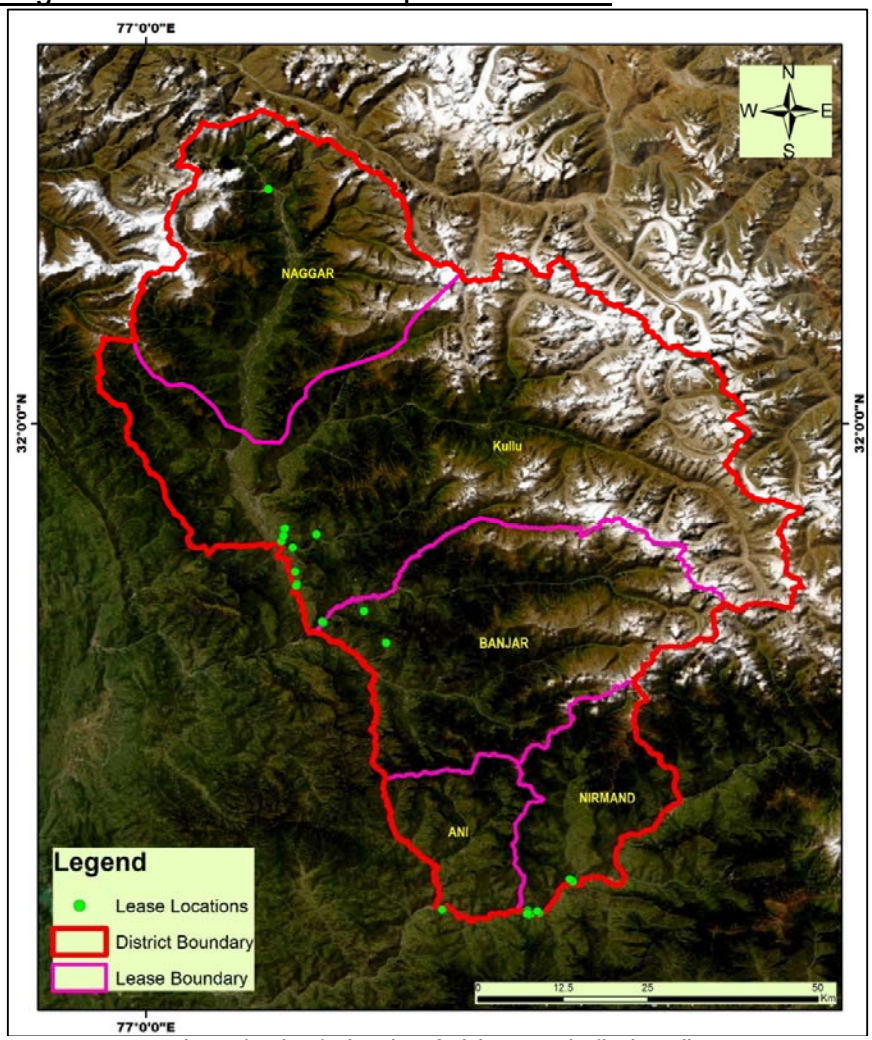


Figure showing the location of Mining Lease in district Kullu

19. Details of the area of where there is a cluster of mining leases viz. number of mining leases, location (latitude and longitude)

The details of Quarries existing within a 500m radius are considered as clusters of Mining Leases as per the MoEF guidelines.

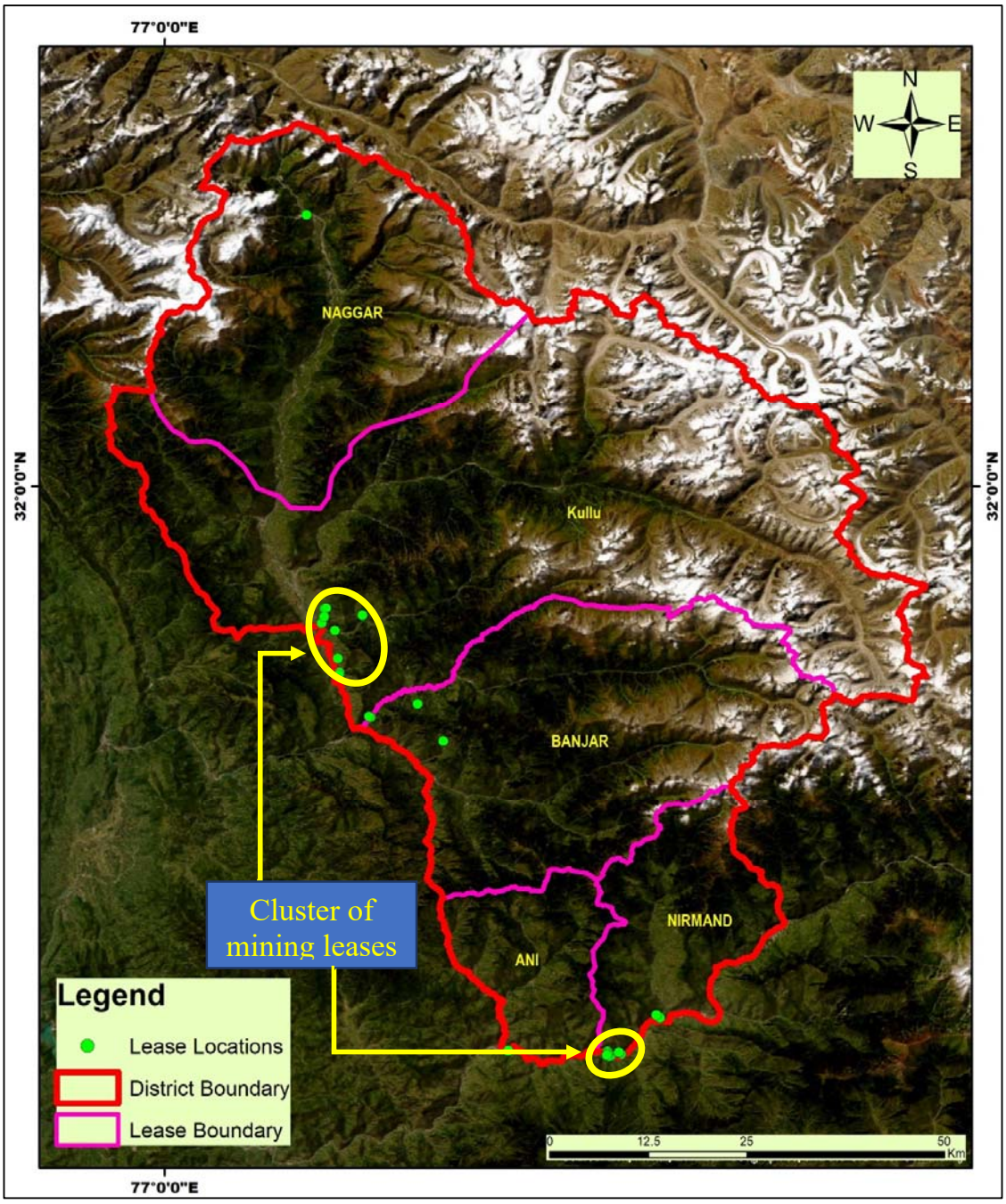


Figure showing the location of cluster of mining leases in district Kullu

20. Details of Eco-Sensitive Area, if any, in the district;

There is no eco-sensitive area in Distt. Kullu

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.

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 waste water 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 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) and Minerals (Prevention of Illegal. Mining, Transportation and Storage) 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.

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 for any disaster. Other risks which 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 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 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 reported.

26. Plantation and Green Belt development in respect of leases already granted in the district;

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 top soil 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 Kullu 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 in 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 the mineral reserves thereon is 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. Regular check and associated report shall be submitted to DLTF and uploaded on the website.
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 mining department shall include submission of an annual environmental audit report as one of the conditions in the mining lease agreement. The annual audit for each river bed mining lease shall be carried out and the audit report shall be uploaded on the website of district administration. The audit shall be carried out by an independent team of 3 members nominated by District Collector/Magistrate/Commissioner comprising of Ex-Serviceman, Ex-Government officials of repute, Professor or Person having experience of mining/environment. The guidelines and method of the audit shall reflect adequately the monitor-able parameters and output and reflect the compliance status with respect to the conditions imposed by the regulatory authorities including conditions of Environmental clearance.
16. 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.

Comments/ Suggestions:

HPSEIAA in its 69th meeting on dated 18th June, 2024 approved the DSR of district Kullu and decided to upload the DSR on public domain/ official websites of Department of Industries and Department of Environment, Science Technology & Climate Change for twenty-one days. The comments, if received, shall be considered and if found fit, shall be incorporated in the final Report. As per the decision of the HPSEIAA the DSR was uploaded on the portal. The suggestions received from the users through e-mail on ms.hpseiaa@gmail.com & remarks of the Industries Department are as under:

#	District	Email dated	Comments	Forwarded to industries	Remarks from Industry Deptt., if any
1.	Kullu	17-Jul-24	My project is not listed on DSR , situated in Moza Kothi, Mohal Banogi , Tehsil Sainj, District Kullu, Area 13-12 Bigha	18-Jul-24	The letter of intent is in-principle approval to obtain the required clearances for the grant of mineral concession. The applicant has to complete the codal formalities like preparation of a mining plan and has to obtain environmental 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 intent 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 either extended or withdrawn. Please see point No. 13 DSR District Kullu as well as refer to the email sent on 19.07.2024 sent to ms.hpseiaa@gmail.com
2.	Kullu	17-Jul-24	Kindly update our lease area details in the District survey report for extraction of rough salb Slate by Smt. Bimla Devi W/o Shri Radha Krishan having lease area 8-05-00 bighas falling in Mauza/Mohal Raila/Bhallan bearing khasra No 3683/303,3740/302 & 3742/3682/303 Tehsil Sainj Distt Kullu State Himachal Pradesh.	18-Jul-24	-do-

3.	Kullu	17-Jul-24	Please update our lease area in the district survey report of Kullu District.Details of our lease area given below Shri Rajinder Kumar extraction of Stone falling in mauza and Mohal Dyar Kothi Kot Kandi having khasra No 2574/2 2584/2 and 2893/2576/2 Tehsil Bhunter Distt Mandi Himachal Pradesh.	18-Jul-24	-do-
4.	Kullu	17-Jul-24	Not included in DSR - Kindly update our lease area in the district survey report of kullu district as we are in process of getting environmental clearance with khasra no Shri Nageen Chand Sand & Stone Mining Project" Located at Khasra No. 2526, 2527, 2507/1, 2507/2, 2507/3 & 2508(Private Land) Near: - Mauza/Mohal: Nithar, Sub- Tehsil Nithar, District: Kullu (H.P.). Lease Area: 10-18 Bigha Production Capacity:14,440 TPA(ROM) [Sand: 12996 MT & Stone: 1444 MT	18-Jul-24	-do-
5.	Kullu	17-Jul-24	Not included in DSR - Extraction of Sand, Stone, & Bajri over an area situated in Khasra No. 5681, measuring an area 05-00 bighas (Private Land/Hill Slope) falling in Mauza/Mohal Neethar, Sub-Tehsil Neethar, District Kullu, Himachal Pradesh, proposed by Sh. Atul Sharma, S/o Sh. M.D. Sharma, R/o Sainj, P.O kirti, Tehsil Kumarsain, District Shimla, H.P.	18-Jul-24	-do-
6.	Kullu	17-Jul-24	Not included in DSR - Extraction of Slate over an area situated in Khasra No. 3156/1, 3157/1, 3158/1/2 & 3380/1, measuring 05-04 Bighas (Private Land/Hill Slope) falling in Mauza/Mohal Bhallan-II, Sub-Tehsil Sainj, District Kullu, Himachal Pradesh, Proposed by Sh. Chaman Lal, S/o Sh. Om Prakash, Village & P.O. Thela, Tehsil Bhunter, District Kullu, Himachal Pradesh	18-Jul-24	-do-
7.	Kullu	17-Jul-24	Not included in DSR - Terrace deposit mining project for the extraction of Sand, Stone & Bajri over an area situated in Khasra No. 4096 and 4093/3 measuring an area 03-10 Bighas (Private Land/terrace deposit) falling in Mauza/Mohal Palehi Kothi, Tehsil Nithar, District Kullu, Himachal Pradesh, proposed by Sh. Sanyog	18-Jul-24	-do-

			Kumar, Village Thaleen, Post Office & Tehsil Nithar, District Kullu, Himachal Pradesh		
8.	Kullu	17-Jul-24	Not included in DSR - Extraction of Stone over an area situated in Khasra No. 173, measuring an area 07-01-00 Bighas (Private Land/Hill Slope) falling in Mauza/Mohal Sarahan, Tehsil Nirmand, District Kullu, Himachal Pradesh, proposed by Sh. Neeraj Kumar, S/o Sh. Ganesh Negi, VPO Nogli, Tehsil Rampur, District Shimla, H.P.	18-Jul-24	-do-
9.	Kullu	17-Jul-24	Not included in DSR - Extraction of Sand, Stone, & Bajri over an area of 12-10 Bighas, Tukkra No.1 (Govt Diverted land/Hill Slope) falling in Mauza & Mohal Phati Soedhar, & Kothi Sirigarh, Tehsil Anni, District-Kullu, Himachal Pradesh, proposed by Sh. Satya Paul Thakur, as per EC letter production is 52,250 TPA, Reference (EC letter attached)	18-Jul-24	-do-
10.	Kullu	10-Jul-24	Request for the incorporation of details regarding our mining site in the name of Sh. Neeraj Kumar, into the District Survey Report prepared and available online for public comments, as there is no details mentioned in DSR with respect to my mining site. Letter of Intent vide letter no. Udyog-Bhu(Khani-4)Laghu-667/2018-306 on dated 12/04/2023 is issued for extraction of stone for the area measuring 07-01-00 Bighas, bearing Khasra number 173 falling in Mauza/Mohal Sarahan of Tehsil-Nirmand, District-Kullu, Himachal Pradesh.	12-Jul-24	-do-

The Deptt. of Industries vide email dated 19th July, 2024 informed that the Department grants mineral concessions by two modes, one through auction and another through mining leases. In both the 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 letter of intent is in-principle approval to obtain the required clearances for the grant of mineral concession. The applicant has to complete the codal formalities like preparation of a mining

plan and has to obtain environmental 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 intent 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 either extended or withdrawn.

So, the list of letters of intents cannot be provided at this stage as these are dynamic in nature and only the information of granted mineral concessions is provided in the updated DSR.