

Hazard Profile of District Kullu

In recent past there has been an increase in the number of natural disasters. The growing incidents of natural disasters are highly correlated to the increasing vulnerability of households and communities in developing countries. District Kullu have also been ravaged by catastrophic events in the past and has worst experience in terms of loss of life and property.

Following matrix highlights the various types of Hazards existing within District Kullu and has the potential of becoming disaster that would have widespread effect on the socio-economic profile of the district:

Table 3: Types of Disasters within District Kullu

TYPES OF HAZARD	
Geologically	<ul style="list-style-type: none"> ❖ Earthquake ❖ Landslides ❖ Dam failure
Meteorological	<ul style="list-style-type: none"> ❖ Floods ❖ Hail storm ❖ Heat wave and cold wave ❖ Droughts ❖ Thunder and lightening ❖ Cloud burst
Chemical and Industrial Hazards	<ul style="list-style-type: none"> ❖ Chemical / Industrial disaster
Accident Related Hazards	<ul style="list-style-type: none"> ❖ Forest Fire ❖ Urban Fire ❖ Major Building Collapse ❖ Serial Bomb Blast ❖ Festival related disasters ❖ Electrical Disasters and Fires ❖ Air, Road accidents ❖ Boat Capsizing ❖ Village Fire
Biologically Related Hazards	<ul style="list-style-type: none"> ❖ Pest Attacks ❖ Cattle Epidemics ❖ Food Poisoning

The following table provides the ranking of individual Hazards within district:

Table 4: - District ranking of individual (Earthquake, Wind and Climatic) Hazards						
Important Factor		20%	20%	20%	40%	Integrated Hazard Zoning
District	Geographical Area (Sq. km)	Seismic Zoning	Wind Zoning	Climate Zoning	Hill Zoning	-
Kullu	5,513	4.0	1.5	1.2	5.0	3.3

Source: - SoER, 2007

Some of the prominent hazards that affect the district are discussed below:

2.2.1. Earthquake

Earthquakes, quite devastating and sudden in nature, are one of the most common types of disasters that hit the state of Himachal Pradesh. Lying in the sensitive Himalayan belt, at the juncture of two active tectonic plates, the region is prone to severe seismic activity. The district of Kullu falls in the highest seismic zone i.e. Zone V and is prone to disastrous earthquakes. The movement of large blocks along the thrust planes resulting in the release of stored energy is the basic cause of earthquakes in this region. According to the seismic zoning map of the state 53.1 % area of Kullu is liable to the severest designed Intensity of MSK IX or more. Table 4 depicts seismic intensity of district Kullu and figure 3 below illustrates the seismic prone area of the district.

Table 5: - Districts of Himachal Pradesh with Seismic Intensities			
Name of District	Seismic Zones	Intensity MSK IX or more % area	MSK VIII % area
Kullu	V/IV	53.1	46.9

Source: - SoER, 2007

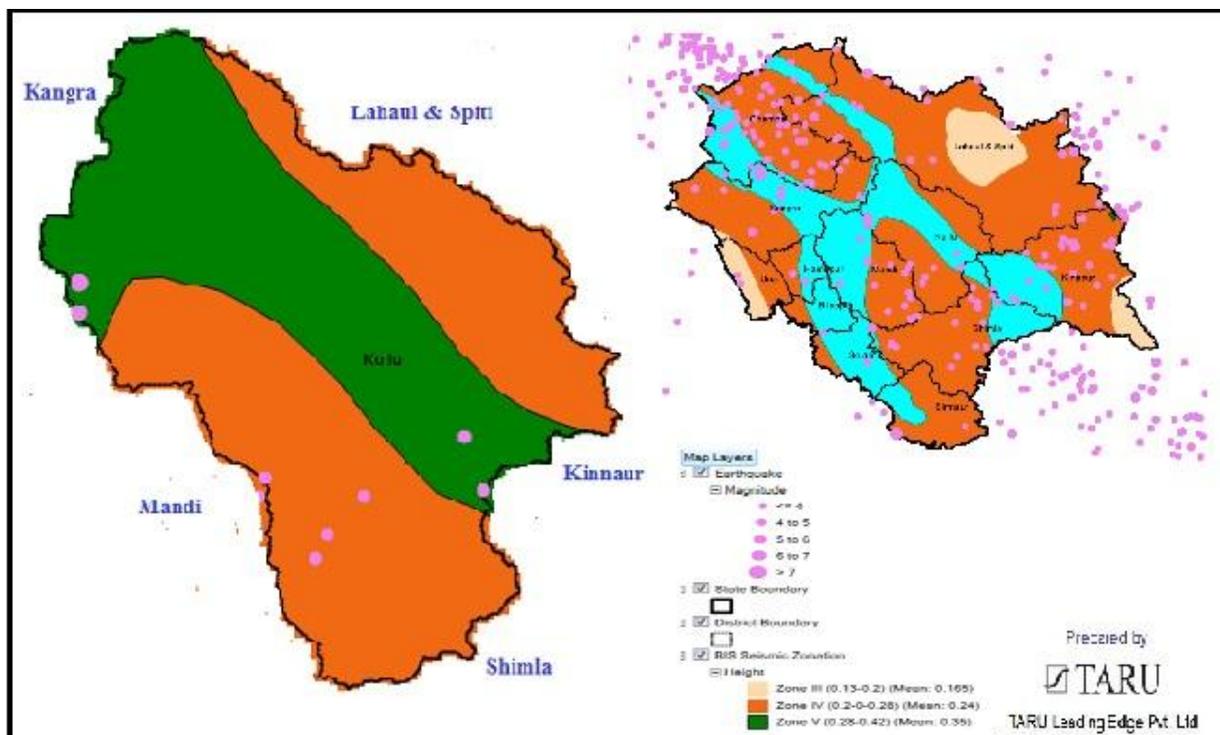


Fig. 4: Earthquake Hazard Risk Zonation Map: Kullu

Recently District Kullu has experienced earthquakes with one having its epicentre within its territory and the rest in its neighbouring district of Shimla. Below is the matrix showing the past earthquakes having occurred in Kullu District.

Table 6: -History of Earthquakes in Kullu District				
S. No.	Year	Magnitude	Location	Losses
1	28 Feb 1906*	6.4	Near Karshing	-
2	19 May 2014	4	Kullu	No loss to life and property
3	20 May 2014	4	Kullu	No loss to life and property
4	27 August 2016	4.6	Anni	No loss to life and property

Source:-IMD: Indian Meteorological Department, DLDH-Oldam ISS: International Seismological Summary, PDE: Preliminary Determination of Earthquakes

2.2.2. Landslide: -

Landslides are the downslide movement of soil, debris or rocks, resulting from natural cause, vibrations, overburden of rock material, removal of lateral supports, and change in the water content of rock or soil bodies, blocked drainages etc. The mass movement varies in magnitude from soil creep to landslides. Solifluction (form of creep in which snow or water saturated rocks move down slope) is another type of mass movement that is common on the higher snow covered ranges. They often take place

in conjunction with earthquakes, floods and volcanoes. At times, prolonged rainfall blocks the flow of river and cause havoc. In the hilly terrain of Himalayas, landslides have been a major and widely spread natural disaster and often affect life and property and occupy a position of major concern.

Looking in to the past history of landslides (Table 6) within Kullu has brought forth that large part of its territory is prone to hazard of landslides (Fig. 3) especially during the rainfall and snowfall months of the year.

Table 7: - History of Landslides within Kullu District			
S. No.	Area	Date	Damage
1.	Luggar Bhatti	12.09. 1995	65 person (35 as per official record) were buried alive during the slide
2.	Manali	5.03.2011	Roads were blocked, electricity Supply dismantled, a four story traditional house collapsed due to weight of four-foot snow in Malana village.
3.	Manali	26.02.2011	Collapsed terraced fields, uprooting and falling of trees, disrupting vehicular traffic at Raison, Dobhi, Alu Ground, Rangri and Manali.
4.	Manali-Leh Highway	16.09.2012	Blocked Manali-Leh highway, Leaving people stranded amidst Chaos and traffic bottlenecks.
5.	Kullu-Anni	28.08 2013	Blocked the Kullu-Anni highway at two places and residents of hundreds of villages falling under 58 panchayats in Anni and Nirmand sub-divisions of Kullu had no connectivity with the District headquarter headquarters for about one week.
6.	Manikaran Gurudwara- Kullu	18.08.2015	Damaged the 3 Rooms of Gurudwara building leaving 7 pilgrims dead and 11 injured with estimated loss of Rs. 29.10 lacs.
7.	Pancha Manihar Road at Parbati HE Project, Stage-II, Kullu	02.09.2016	Total 9 persons (5 killed & 4 injured) were buried alive during the slide.

Table 7 is a matrix of the landslide vulnerability within the district. However, the landslide **Hotspot** areas within district Kullu are:

- Anni Sub-division - Bro, Jagat Khana, Sagofa, Sarga, Deem, Chayal, Gabal and Bakhun;
- Banjar Sub-division - Neuli, Siund, Sainj, Bhyaliand Largi;
- Manali Sub-division - Gulaba, Nehru Kund, Rangri to Aloo ground near Bahnu Bridge

Table 8: - Landslide Vulnerable Area's in Kullu (Area in sq.km)					
District	Severe to Very High	High	Moderate to Low	Unlikely	Total Area

Kullu	1820	3513	65	03	5401
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(Source: - Landslide Hazard Zonation Atlas of India, 2003)

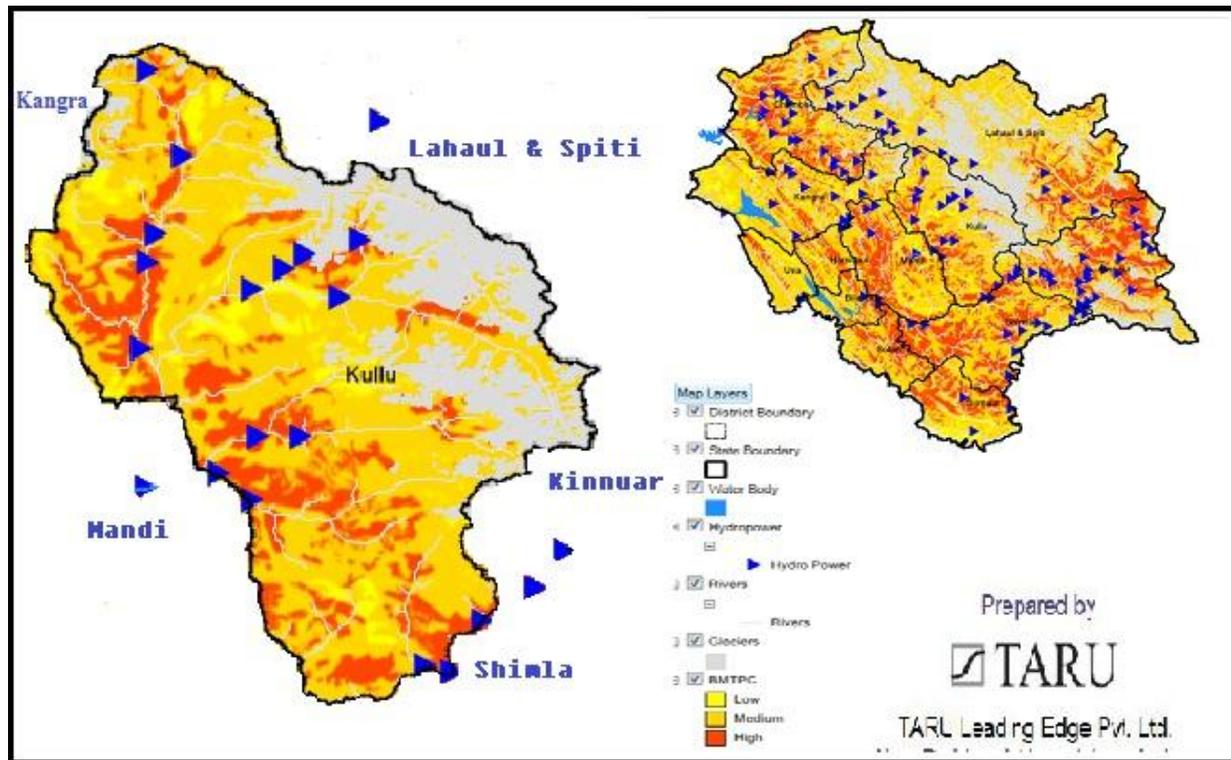


Fig. 5: Landslide Hazard Risk Map Kullu

2.2.3 Floods:-

Flash floods are short lived extreme events, which usually occur under slowly moving or stationary thunderstorms, lasting less than 24 hours. As a result of the high velocity of the current which can wash away all obstacles in its way, this phenomenon has resulted in enormous loss of life and property in various parts of the region. Glacial melting due to global warming is another major cause of flash floods as the major glaciers in the higher hill tops are receding at an alarming rate due to natural anthropogenic reasons. Heavy rains and floods cause damages to cultivated land of the farmers and wash away the bridges, human beings and cattle heads.

The **Hotspots** of flood prone areas within Kullu District (fig 4) are:

1. Anni Sub-division are Luhari, Gugra, Kamand, Anni, Karanaand Logati;
2. Banjar Sub-division are Gushaini, Bathahed, Jibhiand Manglore;
3. Manali Ssub-division are Anjan Mahadev, Dhundi, Pagal Nalla, Solang, Bhahang, 15 mile and Patli kuhl

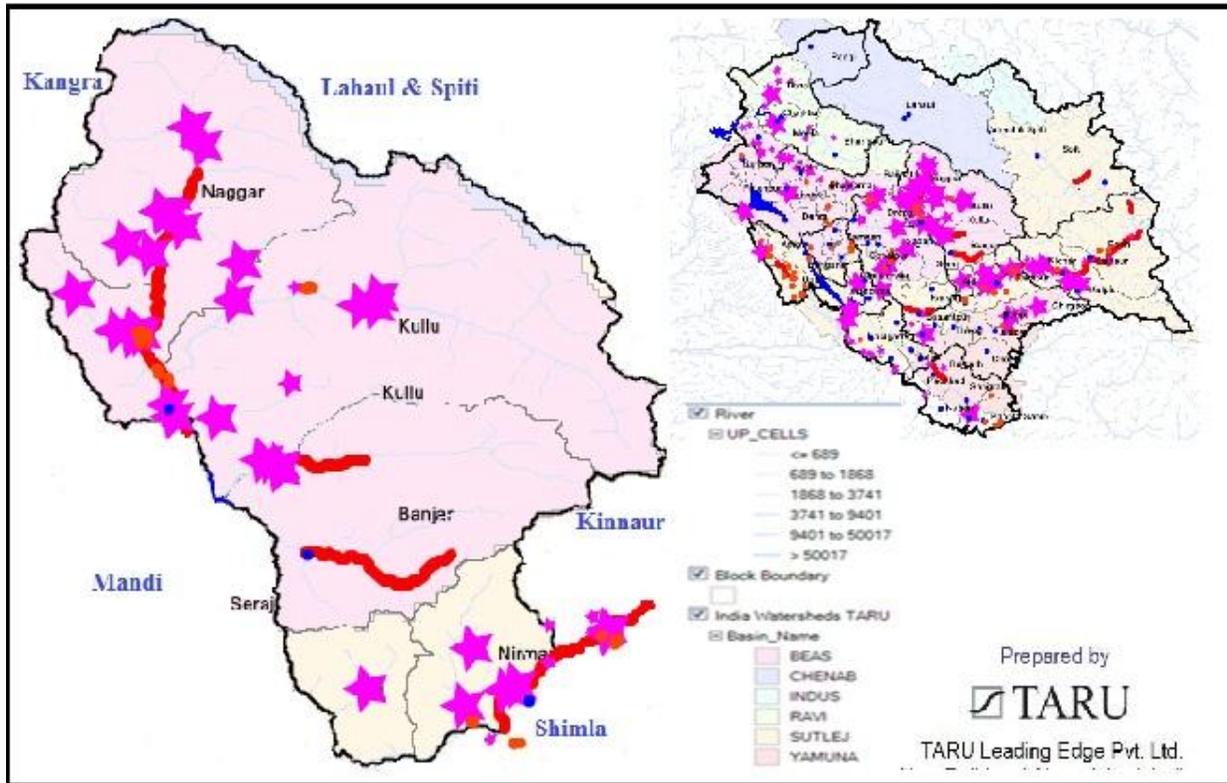


Fig. 6: Flood Hazard Risk Zonation Map: Kullu

The past history of floods (Table 8) are indicative of the non - existence of any major flood over the last 13 years which is contributed to low rate of rainfall.

Table 9: - History of Flash Flood within Kullu District

Sr. No.	Prominent Flash Floods	History of Damage Occurred
1.	December 1988	15 houses, 35 bighas of agricultural land and about 600 apple trees in Solang village washed away. 32 persons and 35 cattle heads also lost their lives. 2 kms stretch of NH-22 across Solang Khad was also washed away. The hydro project work of Bhaba nagar suffered complete damages.

2.	4th September 1995 in Kullu	There was 278 bigha's of agriculture land (8736 apple, 687 pears & 293 plum trees) damaged due to floods caused due to heavy rainfall and another of 1170 bigha lands of Government leading to total loss of Rs. 55.60 lacs.
3.	August 1997	Triggered due to cloud burst. 124 human lives were lost.
4.	4-5 & 12 September Flash Flood in Kullu	Flood and Landslide along Beas river in the Kullu valley killed 65 people , NH damaged at numerous places , loss to the government and private property, road and bridges estimated US \$ 182 million
5.	Flash floods in the night of 21st and 22nd August 2001, cloudburst in Anni Sub Division of Kullu district occurred	Due to flash flood in village Badhali 2 houses occupied by a couple was buried alive and their two children were injured. In village Sarli 7 people lost their lives, 15 houses were washed away, besides the loss of 12 cows, 18 oxen and 40 sheep, about 115 bighas of agriculture and horticulture land was washed away.
6.	Flash flood on the night of 2nd July 2001 in Sainj Valley district Kullu	Cloudbursts in the upper reaches of Satluj valley caused flash flood in two nallahs namely, Sainj and Jeeba affecting about 40 families, 2 bridges on Sainj and Jeeba nallahs and plenty of fertile land was also washed away. At number of places connecting road to Siund and Sainj was also washed away. Two persons and 5 cattle perished. Some other areas in Kullu district were also affected due to excessive rains in July and the population of 6355 was adversely affected.
7.	Flash floods due to cloudburst in Gharsa valley on 16th July 2003 in Kullu district	21 people lost their lives, 21 people suffered major injuries and 9 are still missing.
8.	Flash floods in Kangni nalla near Solang in Kullu district on 7th August 2003	30 people lost their lives, 19 were injured, while 9 people lost their lives due to landslide near Bahang nalla
9.	Bahang valley (near Manali) 24th July 2003	2 people lost their lives. Property and houses were damaged

Sources: - HPSDMA, 2012

2.2.4. Cloud Burst:-

A cloudburst is an extreme amount of precipitation, sometimes accompanied with hail and thunder, which normally lasts no longer than a few minutes but is capable of creating flood conditions. It is one of the common disasters in the district which is largely responsible for flash floods. The **Hotspot** areas within District are lying in Manali sub-division, namely around Gulaba, Solang, Prini and Vashisht. The past history is depicted in table 8 above.

2.2.5. Snow Avalanches:-

Avalanches are caused when the balance is lost and snow cover on a slope tends to slide down because of gravity when the forces exceed the resistance. Avalanches are rarely observed closely since

they normally occur during a short time period of one or two minutes. Major causes of avalanches can be classified into fixed (prime factors) and variable factors (exciting factors), such as weather conditions and the weight of the snow cover. The types and scale of avalanches can differ depending on the combination of the various factors and their scale. They are common in elevations of more than 3500 m on slopes of 30°-45°. Convex slope covered with grass are more prone to avalanches causing great damage to life and property. The villages at high altitudes and army and para-military camps are frequently hit by this form of natural calamity. Table 9 shows avalanche accidents in Kullu.

Table 10: - District-wise Breakup of the Avalanche Accidents: Kullu				
District	No. of Accidents	Persons Involved	Persons Killed	Persons Injured
Kullu	6	13	09	04

Source: - SASE, DRDO Chandigarh

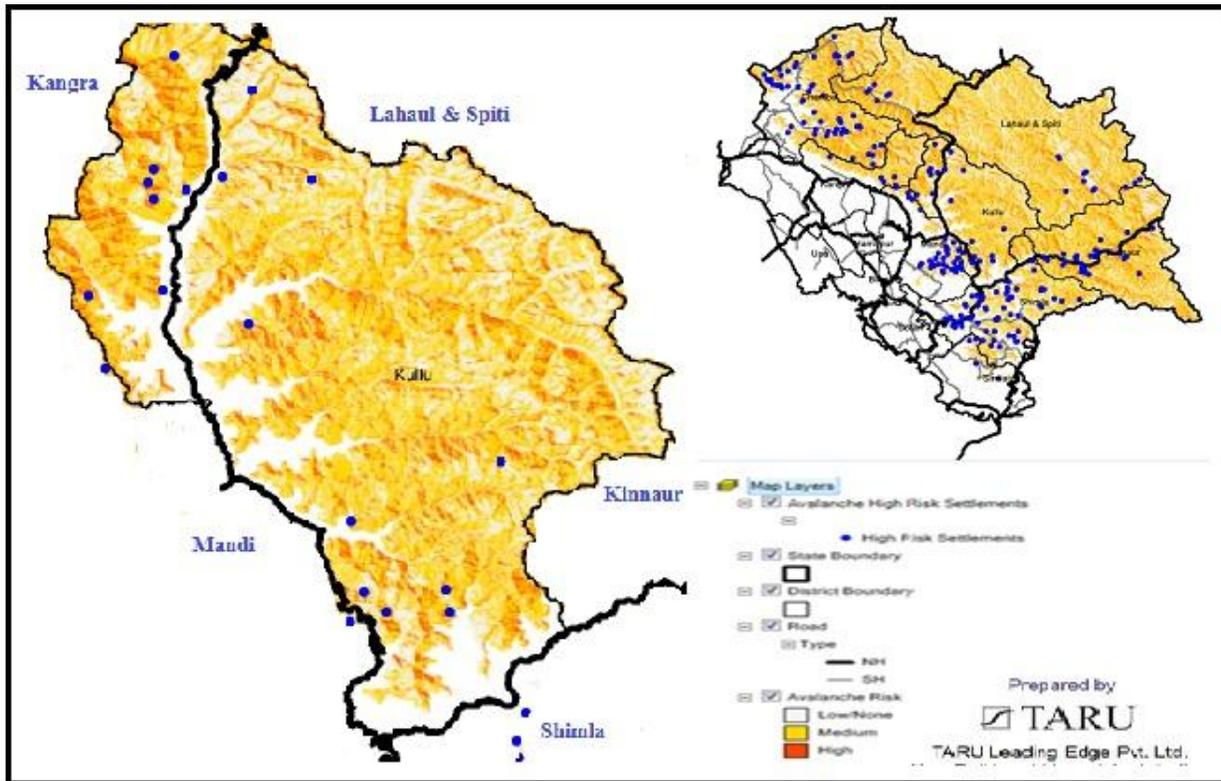


Fig. 7: Avalanche Hazard Risk Zonation Map District Kullu

The scale of damage can differ depending on the scale and type of avalanche leading to Traffic blockades due to snow deposition on road surface; roads damaged by avalanches, road structures, such as retaining walls, overturned. However, structures damaged by an avalanche during construction of roads occur most frequently.

2.2.6 Fire

The most common hazard regards to fire within District Kullu pertains to forest and domestic fires.

2.2.6.1 Forest Fires: -

Forest fires pose a great threat during summer, not only to the forest wealth but also to the entire regime of fauna and flora, seriously disturbing the bio-diversity and the ecology and environment of a region. Approximately 90 % of the forest fires are human-induced, intentional or unintentional due to the negligence and poor knowledge of the people. Collection of forest produce, shifting cultivation, throwing mouldering bidis, cooking food in the forest etc. are the basic anthropogenic causes that ignite forest fires

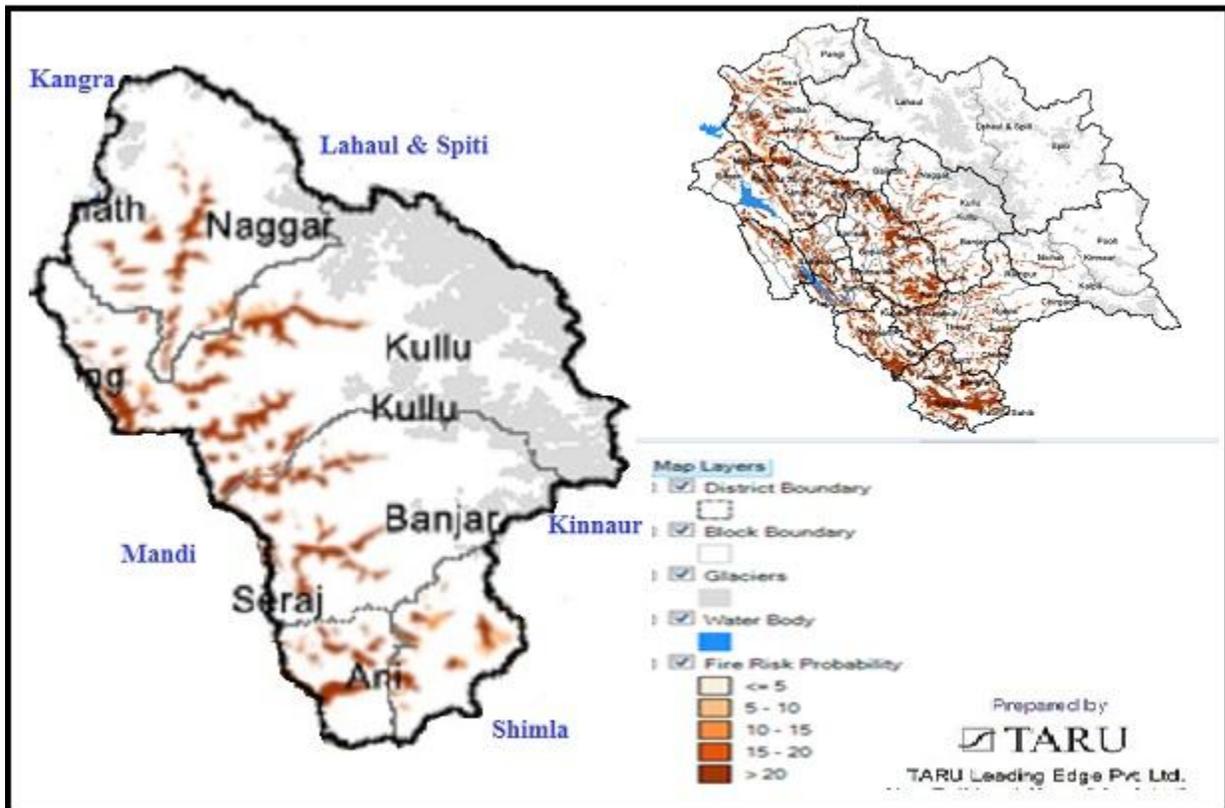


Figure 8: Forest Fire Hazard Risk Map District Kullu

2.2.6.2 Domestic Fires:-

Most of the building structures within Kullu District are traditional houses, castles, museums etc. built with “kath-kuni” architectural style. Timber is the major constructional material and such structures are quite prone to fire incidents in the district especially during the winter months due to storage of fodder and wood. Due to houses being constructed close to each other, spark in one house can prove dangerous

to other villagers. Many villages in the district have no road connectivity while others are linked with narrow roads that are incapable of accommodating large fire tenders.

Hotspots for fire in Kullu District are Sidhwa, Bashir, Mohini, Channaun, Chaddiyar, Chipani, Pharyari, Shrikot, Garuli, Gehra, Goshala, Jamad and other villages of Banjar. The recent time fire incidence at Banjar highlighted the need for fire station at Banjar for the nearest fire service is at a distance of about two hours. Some villages are at a distance of about 100 km from Kullu, which for fire tenders to reach will take even more time.

Table 11: - Incidents of Village and Urban Fires within Kullu District								
District	No. of Fire Stations	No. of fire Calls Attended	No. of Human Lives		No. of cattle Lives		Value of property (Rs in Lakhs)	
			Saved	Lost	Saved	Lost	Saved	Lost
Kullu	02	75	01	03	-	37	1715	381

Source: - Chief Fire Officer, Himachal Pradesh

Peep into the past domestic fire incidences as shown (Table 11) below highlighted the loss not only to life but to large scale property ranging in crores of rupees.

Table 12: Past Fire Incidents in Kullu			
S. No.	Date	Area	Losses
1.	June 2007	Kullu	Gutted 6 houses, 8 shops, 2 rooms of a primary government school, 34 families rendered homeless and 13 villagers were injured
2.	19th December, 2007	Banjar (Mohni)	46 Residential houses & cowsheds completely damaged and 9 Residential houses partially damaged & total Rs. 30.15 lacs relief were distributed.
3.	December 2013	Manali	Property worth Rs. 1 crore damaged
4.	February 2014	Manali	-
5.	April 2014	Kullu	13 houses gutted, property valued at 2 crore was destroyed, inflicted losses on 31 families, 4 of which lost their homes.
6.	15 th November, 2015	Banjar (Kotla)	Gutted - 49 Residential houses, 3 cowsheds, 2 shops, 3 temples & 2 bhandars fully damaged and 4 Residential houses partially damaged inflicting loss on 113 families and total 64.91 lacs relief were distributed.
7.	2 nd December, 2016	Kullu (Gahar Phati Kais)	10 pucca houses (7 completely & 3 partially) have damaged consisting of 25 families comprising of 93 members in all & total damage worth Rs. 1.75 Crores.

8.	13 th December, 2016	Kullu (Banjar)	3 Kucha houses, 2 cows, 12 cattle & total damage worth Rs. 16.20 lacs
9.	17 th December, 2016	Kullu (Banjar)	14 cattle with total damage worth Rs. 1.00 lacs

2.2.7 Drought

The slowest of all hazards and that can be reverted with various measures. Moisture retention and drought proofing to mitigate, preparing contingency plans and operationalization are some measures against droughts. It can lead to shortage of water, loss to agriculture, and horticulture crops, power generation. Recently due to lack of rainfall within District Kullu a drought like condition is being created.

2.2.8 Road Accidents

The high frequency of vehicles, congested roads, reckless driving and lack of safety measures, over speeding, unplanned construction with narrow roads are some of the major factors behind road accidents within Kullu district. The matrix of past road accidents within district are shown below:

Table 13: Past Road Accident within Kullu District			
S. No.	Date	Area	Losses
1.	23 rd July, 2015	Kullu	1 Private Bus with total 69 peoples (46 kill & 23 injured) & total damage worth 1.62 Crore.
2.	16 th December, 2015	Kullu	1 Vehicle damaged worth Rs. 20.15 lacs.
3.	23 rd December, 2015	Manikaran	23 survivals, 43 pilgrims dead with 3 bodies non-traceable with a total economic loss attributed to Rs. 1 crore 28 lakh.

Hotspots for the Road Accidents within District Kullu have been attached at **Annexure I**

2.2.9 Stampede:-

Kullu district is famous for its temples, festivals and fairs. Kullu has number of temples viz Raghunath Temple, Shringi Rishi Temple (Banjar), Maha Devi Tirth Temple, Bijli Mahadev, Devta Narsingh, Hidimba temple etc. visited by thousands of pilgrims. The International Kullu Dusshera is visited by thousands of tourists. The department of police and Home Guards are assigned with the task of managing the rush as per ESF with external help of ITBP Babeli and SSB Shamshi if required.

2.2.10. Chemical or Biological Hazard: -

There is an IOC depot stationed at Mohal, Kullu having large storage capacity for supplying oil to districts of Kullu and Lahaul and Spiti, along with number of petrol pumps in the district. All are vulnerable destinations as they mostly lie in populated areas. With incidents of oil spillage due to accident in the past this makes the surrounding population vulnerable, in case timely steps are not under taken.

2.2.11. Wind Storm: -

“A storm with high winds or violent gusts but little or no rain” is defined as wind storm. During winter season Kullu district is prone to wind storms leading to destruction of lives and properties. District Kullu is not much affected by high speed winds, except during snowfall in areas of Manali and Anni

2.3 Climate change and its impact on different aspects in Kullu district

Kullu district is environmentally most fragile with large scale human activity due to tourism, power projects and vehicular movements. Unpredictable period of rains and rising temperature are indicative of the temperature rising in Kullu district. In the Kullu valley of Himachal Pradesh it has been reported that the rainfall has decreased by about 7cm, snowfall by about 12 cm, but the mean minimum and maximum temperatures have increased by 0.25-1 degree Celsius while massive glacial retreats at the rate of 178 m/ year in Parbati Glacier of Kullu district has been observed during 1962 to 2000. These observations, irrespective of the differences in the retreat of glaciers, suggest that global warming and climate change has affected snow-glaciers melt and runoff pattern in the Himalayas, along with effects on agriculture, tourism, economic loss to people in Kullu district (**Annexures II**)

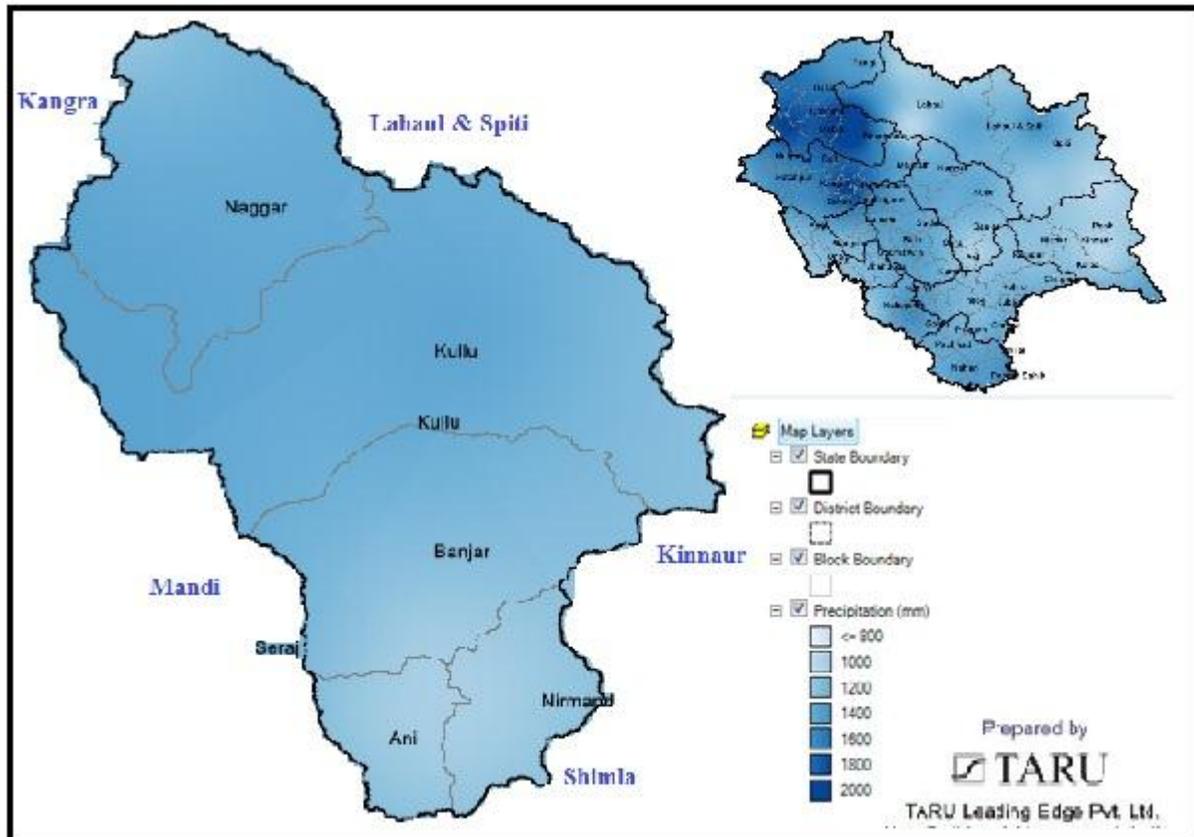


Fig 9: Hazard Precipitation Mapping for District Kullu

Table 14: Hazard Seasonality Map of District Kullu													
S. No.	Hazard	Probable Months											
		Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec
1.	Earthquake	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
2.	Landslides	Purple	Purple	Purple			Purple	Purple	Purple	Purple			Purple
3.	Flood						Dark Blue	Dark Blue	Dark Blue	Dark Blue			
4.	Cloudburst						Light Blue	Light Blue	Light Blue	Light Blue			
5.	Forest Fires					Dark Red	Dark Red	Dark Red					
6.	Domestic Fires	Grey	Grey	Grey							Grey	Grey	Grey
7.	Drought						Light Red	Light Red	Light Red				
8.	Cold wave	Orange	Orange	Orange								Orange	Orange
9.	Heat wave					Light Blue	Light Blue	Light Blue					

10.	Hailstorm												
11.	High Winds												
12.	Road Accidents												

2.4 Vulnerability Analysis

2.4.1 Physical vulnerability: -

Disasters are the realization of risk and often occur at specific sites (i.e. hazard sites). Table 14 depicts Earthquake Intensity and Building Types in Kullu district. Lot of wooden material is being used in the built structures which are again highly prone to fire hazards. Construction activities associated with Hydel Power projects also affect the fragile ecology of the state. The built-up land use/cover includes not only urban infrastructure within towns and cities, but also individual dwellings, roads linking settlements, and other human-built structures. The removal of a forest cover from a steep slope often leads to accelerated surface erosion and dramatically increases the chances for landslides as well as runoff. The Main market areas of all the sub divisional headquarters are highly crowded with narrow winding roads making them most vulnerable to hazards like earthquakes, fire and road accidents. The inaccessible narrow roads to the remote areas of the district Kullu are also source of the village vulnerability as the fire tenders and ambulances cannot reach these far flung areas when an incidence like fire takes place. Cutting along mountain slopes for widening and formation of Four Lane of the NH 21 makes the area along these belts vulnerable for the hazard.

Table 15: Earthquake Intensity and Building Types : Kullu

District Kullu Total No. of Housing units	MSK IX or More % Area	MSK VIII % area	A-Cat (Clay)	A-Cat (stone)	B-Cat (brick)	C-Cat Reinforced buildings, well built wooden structures	X-Cat Other Types not covered in A, B, C. These are generally light
123455	53.1	46.9	1.22	88.69	3.00	6.80	0.30

Source: Vulnerability Atlas of India of Himachal Pradesh

Housing Vulnerability: -Table 15 & 16 shows the district-wise residential houses and distribution of houses by predominant materials of roof and wall and level of damage risk respectively. The tables clearly show that 69.5 % houses falls under Category A, which cannot withstand the vagaries of Disasters like earthquakes. Rural wooden structures are particularly prone to fire hazards in the district. House Structures falling in Category B comprise of 10.1% while 9.1% structures comprising of Category C, are reinforced and well-built wooden structures and only 1.4% category X are made of light material and can be considered safe construction.

Table 16: District-wise Residential Houses: Kullu

District	2001			2011		
	Total	Rural	Urban	Total	Rural	Urban
Kullu	77,655	69,865	7,790	94,807	84,358	10,449

Table 17

Distribution of Houses by Predominant Materials of Roof and Wall and Level of Damage Risk

Table No. : HP 04		State : HIMACHAL PRADESH		KULLU										
Wall / Roof		Census Houses		Level of Risk under										
		No. of Houses	%	EQ Zone			Wind Velocity m/s				Flood Prone Area in %			
				V	IV	III	II	55 & 50	47	44 & 39		33		
				Area in %		Area in %								
WALL				67.4	32.6								100	
A1 - Mud														
Unburnt Brick Wall	Rural	2,834	1.9											
	Urban	249	0.2											
	Total	3,083	2.1	VH	H								M	
A2 - Stone Wall	Rural	113,753	74.4											
	Urban	4,558	3.0											
	Total	118,311	77.4	VH	H								L	
Total - Category - A		121,394	79.4											
B - Burnt Bricks Wall	Rural	8,364	5.5											
	Urban	7,124	4.7											
	Total	15,488	10.2	H	M								L	
Total - Category - B		15,488	10.1											
C1 - Concrete Wall	Rural	1,013	0.7											
	Urban	294	0.2											
	Total	1,307	0.9	M	L								VL	
C2 - Wood wall	Rural	11,092	7.3											
	Urban	1,511	1.0											
	Total	12,603	8.3	M	L								M	
Total - Category - C		13,910	9.1											
X - Other Materials	Rural	1,827	1.2											
	Urban	246	0.2											
	Total	2,073	1.4	M	VL								M	
Total - Category - X		2,073	1.4											
TOTAL BUILDINGS		152,865												
ROOF														
R1 - Light Weight Sloping Roof	Rural	33,435	21.9											
	Urban	4,497	2.9											
	Total	37,932	24.8	M	M								H	
R2 - Heavy Weight Sloping Roof	Rural	90,084	58.9											
	Urban	2,769	1.8											
	Total	92,853	60.7	H	M								L	
R3 - Flat Roof	Rural	15,364	10.1											
	Urban	6,716	4.4											
	Total	22,080	14.5											
TOTAL BUILDINGS		152,865												

Probable Maximum Precipitation at a Station of the district in 24 hrs is 400 mm

Housing Category : Wall Types
 Category - A : Buildings in field-stone, rural structures, unburnt brick houses, clay houses
 Category - B : Ordinary brick building, buildings of the large block & prefabricated type, half-timbered structures, building in natural hewn stone
 Category - C : Reinforced building, well built wooden structures
 Category - X : Other materials not covered in A,B,C. These are generally light.
 Notes: 1. Flood prone area includes that protected area which may have more severe damage under failure of protection works. In some other areas the local damage may be severe under heavy rains and checked drainage.
 2. Damage Risk for wall types is indicated assuming heavy flat roof in categories A, B and C (Reinforced Concrete) building
 3. Source of Housing Data : Census of Housing, GOI, 2001

Housing Category : Roof Type
 Category - R1 - Light Weight (Grass, Thatch, Bamboo, Wood, Mud, Plastic, Polythene, GI Metal, Asbestos Sheets, Other Materials)
 Category - R2 - Heavy Weight (Tiles, Slate)
 Category - R3 - Flat Roof (Brick, Stone, Concrete)
 EQ Zone V : Very High Damage Risk Zone (MSK > IX)
 EQ Zone IV : High Damage Risk Zone (MSK VIII)
 EQ Zone III : Moderate Damage Risk Zone (MSK VII)
 EQ Zone II : Low Damage Risk Zone (MSK < VI)
 Level of Risk : VH = Very High; H = High;
 M = Moderate; L = Low; VL = Very Low

BMIPCE Building Materials & Technology Promotion Council Peer Group, MoH&UPA, GOI

2.4.2. Socio-Economic Vulnerability: -

As per the demographic and socio- economic data of district Kullu the local people within district are quite vulnerable towards natural disasters in the district. Large proportions of socially weak groups are generally located in disaster prone areas. The primary causative factor in the increased risk is in growth of tourist demand and intensification and diversification of commercial agriculture. Research reveals that women and children suffer immensely from the hazardous impacts of disasters, severe weather events, and climate change because of cultural norms and the inequitable distribution of roles, resources, and power. District Kullu also has Nomadic Herders namely the Gaddi's and the Gujjars which are equally vulnerable to the vigour's of disasters.

Table 17 shows Social Vulnerability of Kullu district. Table 18, 19 and 20 shows different aspects of social vulnerability in the district i.e. physically challenged people, pensioners and unemployed registered people in the district. The District has undergone significant land use/cover change and intensification with regards to construction. The unchecked expansion of built-up areas into geomorphologically active regions of river flood plain, unstable slope and debris flow has been accelerating and is a major cause of concern.

Table 18 :-Social Vulnerability of Kullu							
District Kullu	Area in km ²	Population	Female/ 1000 Males	Density Per km ²	Urban population (%)	Literacy (%)	Percentile villages with infrastructure
	5,503	4, 37,903	942	80	9.45	79.4	45.93
Table 19: - Physically Challenged People: Kullu							
	VI	HI	OI	MR	TOTAL		
	1093	1048	1946	483	4570		
Table 20: - Unemployed Registered with Employment Exchanges: Kullu (Dec 2016)							
	Registration	Vacancies	Submission	Placement	Live Register (30.11.2016)		
	7708	74	2052	135	43064		
Table 21: - Social Security Pensioners- Most Vulnerable Population (Dec 2016)							
	National Indira Gandhi Widow pension	Old Age Pension	Widow Pension	National Indira Gandhi Disabled pension	Handicapped Allowance	Total	
	1249	9244	5695	20	3286	19494	

Source: Department of Social Welfare, Kullu

Table 22: Nomadic Herders within District Kullu		
S. No.	Category of Nomadic Herders	Pastoral Areas / Belt (During Summers)
1.	Gaddis (Sheep's and Goats)	Manikaran; Mantali; Rothang valley; Banjar valley
2.	Gujjars (Bovine's)	Bhuntar tehsil; Nithar ; Anni and Nirmand

Source: Department of Animal Husbandry, Kullu

Table 23: Number of Road Accidents : Kullu				
Sr. No.	Year	Total No. of Road Incident	Total No. of Dead	Total No. of Injured
1.	2010	185	55	296
2.	2011	196	72	410
3.	2012	157	68	240
4.	2013	176	81	311
5.	2014	166	63	305
6.	2015	185	104	375

7.	2016 (As on 30/11/2016)	184	90	298
Total		1249	533	2235

Source: Police Department, Kullu

Overall Vulnerability of the District:

District Kullu is prone to multiple disasters and the overall vulnerability of the district has been stated to be very high. The main connectivity of Kullu district with rest of the state is through NH-21. In case of any disaster, if communication through this highway is disrupted then major population of the district will be susceptible to natural wrath. There are 8 Major and 42 minor Hydro Power Projects in the district almost on all major Nallas, Streams and also the run of river projects which further adds to the vulnerability and risk life and infrastructure. Kullu valley being paradise for adventure sports viz River Rafting, Mountaineering, and Skiing is also course for concern due to its fragile topography and changing climatical scenario which leads to number of miss-happening's every year in the valley. Most of the people in district Kullu live in villages and are dependent on collection of herbs and other medicinal plants from nearby forest which exist on steep slopes. There has been an adverse impact on the population in terms of economic loss and are being severely affected by climate change. Tables 23 and 24 shows matrix related to hazard vulnerability of Kullu district and matrix for the four sub divisions of the districts with regards to disaster vulnerability.

Table 24: - Hazard Vulnerability Matrix: Kullu	
District	Kullu
Total Population	3,81,571
Population Density	80
Area (%) under seismic zone-V liable to design severest intensity	53.1
Buildings in "A" categories (%)	89.91
Infrastructure Risk	Very High
Earthquake Intensity (%) no. s	3.44(19)
Area prone for severe high land slides	1820
Flood Hazard , Excess rainfall intensity	High
Fire	Very High

Table 25: Hazard Vulnerability Matrix Kullu District and its Sub Divisions							
District/ Sub Division	Earthquake	Landslide	Fire	Floods	Avalanches	Industrial	Overall Vulnerability
Kullu (overall)	High	High	Very High	High	Medium	High	Very High
Kullu	High	High	Very High	High	-	Medium	Very High
Manali	High	High	Very High	High	High	Medium	Very High
Banjar	High	High	Very	High	-	Low	High

			High				
Anni	High	High	Very High	High	Low	Low	High

Economics and Statistics Department Government of Himachal Pradesh, September 2016