Preparation of
Hazard, Vulnerability & Risk Analysis atlas and report for the state of Himachal Pradesh

Environmental & Industrial Hazard Risk Assessment

Composite Final Draft Report

(T6)

Prepared for

Disaster Management Cell, Department of Revenue

Government of Himachal Pradesh, Shimla

Prepared by

TARU

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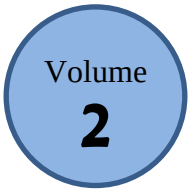
VOLUME GUIDE

This series of reports present detailed technical and methodological documentation of the study entitled "Preparation of Hazard, Vulnerability & Risk Analysis Atlas and Report for the State of Himachal Pradesh" for DM Cell, Revenue Department, Himachal Pradesh.

Hazard Risk

This volume contains Technical papers on hazard risk assessment due to natural and man-made hazards within Himachal Pradesh as presented below.

1. Avalanche Hazard Risk
2. Climate Change & Flood Hazard Risk
3. Drought Hazard Risk
4. Earthquake Hazard Risk
5. **Environmental & Industrial Hazard Risk**
6. Forest Fire Hazard Risk
7. GLOF Hazard Risk
8. Landslide Hazard Risk



Vulnerability and Risk

This volume contains Technical papers on the Vulnerability and Risks to key elements at risk within Himachal Pradesh as presented below.

1. Socio-Economic Vulnerability and Risk
2. Building Vulnerability and Risk

Hazard Risk

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Executive Summary

This study is aimed at collecting and collating secondary data on environmental and industrial hazards. The Himachal state was one of the earliest states to establish agro-industries. The first brewery in India was established in Solan in 1855. But industrial development on large scale happened only since last two decades.

This state has several advantages like availability of surplus electricity, but also faces constraints like difficult terrain. Himachal Pradesh is known for agro industries, but over last three decades it has established several pharma, Cement and hydroelectric projects. Most of the industries are located in the Shiwalik zone in the districts of Solan, Una and Sirmaur districts.

There is no dedicated department for addressing industrial safety and health in the state. These data are handled by Department of Labour and Employment (DoLE). As a result incident report and impact data is not available.

There are eight Major Accident Hazard industries in the state as per the state DoLE. Detailed data on tanks storing the hazardous chemicals is not available.

The primary sample data indicates that torrential rains, floods and drought s are common, which impact the industries indirectly. Drought is impacting the agro-industries due to raw material scarcity and increasing costs. Even though most of the state lies in Zone IV and V earthquake zones, the industrial sector is less aware of these earthquake risks.

The Himachal Pradesh state classified the industries based on Ministry of Environment and Forest's classification as Red, Orange and Green. This classification is based on potential pollution hazards and not based on Hazard potential.

The estimated population of people staying within 1, 2.5 and 5 km radius buffers of Large industries are 2.6 lakh, 5.8 lakh and 10.6 lakh persons. A significant proportion of these people can be directly or indirectly impacted in case of major disasters resulting in closure of the industry or other accidents.

Detailed data collection systems need to be initiated to understand hazards as well as impacts on people and environment.

Chapter 1: Industrial Hazard Risk Assessment

1.1 Objectives

The main objectives of this study are:

1. Mapping of industrial facilities, industrial zones, waste dumping sites effluent release sites using secondary data
2. Inventory of sources and types of Industrial and environmental hazards including one associated with hydro projects
3. Location and types of industrial and environmental hazards
4. Location of past disaster sites
5. Demarcation of exposure areas (potential impact boundaries)

1.2 Constraints

The state of Himachal Pradesh does not have a Directorate of Industrial Safety and health (DISH). The industrial safety issue is being handled by Department of Labor and Employment. This seriously constrains the data collection by the government as well as its availability.

Different sources of data provide different figures of industrial units and workers. It is difficult to reconcile these data sets unless a systematic survey is undertaken and all records are updated.

Due to lack of sufficient secondary data on disasters, a rapid primary study was done to understand the incidence of disasters and their impacts on industry. This survey provided synoptic data on incidences of disasters, but most industries did not provide sufficient financial data to estimate losses due to variety of concerns to share the data. Also, synoptic data was collected from Tourism and transport sectors.

Chapter 2: Himachal Pradesh: Industrial Profile

2.1 Industrial Development in Himachal Pradesh

Himachal Pradesh has a long history of industries. One of the first brewery in India was set up in 1855 in Solan, due to availability of excellent quality of mineral water. The large scale industrial development happened only during last two to three decades.

Himachal is known for abundant hydroelectricity potential, diverse horticultural products and also has minerals like limestone suitable for industries. Hilly region provides diverse ecosystems suitable for horticulture. It was the first state initiative to produce and market bottled apple juice in the country.

Being a hill state, it faces access constraints and higher risks of natural disasters. The climatic and geo-physical reduces the reliability of the road network while uneven distribution of resources limit the advancement of mineral based industries. Other problems faced by the state were non-availability of infrastructure and communication facilities, shortage of capital and lack of modern skills.

The state and national government provided incentives and subsidies to encourage industrial growth, especially over last two decades. These incentives included establishment of industrial estates, fiscal incentives. Industries in Himachal Pradesh produce cement, high-tech products like including telecommunication equipment, optical cables, pharmaceuticals, computer components etc. Incentives for hydroelectric projects during last two decades has resulted in setting up of more than 150 large, medium and small hydroelectric projects. The growth of industry over last decade is presented in the following Table.

Table 1: Growth of Industry in Himachal Pradesh

Sl.	Year	No of Units Setup			Employment Generated			Investment (Rs. In lacs)		
		SSI	MLI	Total	SSI	MLI	Total	SSI	MLI	Total
1	upto02-03	30,176	196	30,372	129,871	29,823	159,694	70,977	237,806	308,783
2	2003-04	663	15	678	3,769	762	4,531	3,708	3,494	7,202
3	2004-05	913	35	948	6,412	3,473	9,885	8,891	30,287	39,178
4	2005-06	914	64	978	6,611	4,606	11,217	12,217	50,159	62,377
5	2006-07	952	46	998	10,665	4,568	15,233	45,273	61,526	106,799
6	2007-08	842	19	861	11,302	1,923	13,225	70,637	48,264	118,901
7	2008-09	909	46	955	10,939	4,225	15,164	73,795	114,103	187,899
8	2009-10	1,032	23	1,055	10,011	2,703	12,714	75,320	134,382	209,702
10	2010-11	963	27	990	10,002	3,740	13,742	96,539	211,834	308,373
11	2011-12	856	16	872	7,732	2,981	10,713	61,909	187,929	249,838
12	2012-13	798	7	805	9,298	339	9,637	96,332	21,169	117,501
Total		**39,018**	**494**	**39,512**	**216,612**	**59,143**	**275,755**	**615,600**	**1,100,953**	**1,716,553**
SSI: Small scale industries; MLI: Medium& Large industries										

Source: Department of Industries, Himachal Pradesh[1]

These figures provide the number of units set up each year and does not provide figures of units closed during the reporting period. The above data shows that the investments in small scale sector is many times that for medium and large industries. The large industries are mainly Cement, hydroelectric and pharma projects. The state still has untapped hydroelectric potential, but environment constraints and high earthquake and flash flood risks as well as environmental concerns are major constraints in hydroelectricity development.

2.1.1 Industry categories

Industries are categorized based on the Classification of Industries

Sr. No.	Classification of Industrial Enterprises	Limit for manufacturing Enterprises. (In plant & Machinery)	Limit for Services Enterprises. (In plant & Machinery)
1.	Micro enterprises	is up to Rs. 25 lakh	up to Rs.10 lakh
2.	Small enterprises	Above Rs. 25 lakh and up to Rs.5 crore.	Above Rs. 10 lakh and up to Rs.2 crore.
3.	Medium enterprises	Above Rs. 5 crore and up to Rs.10 crore.	Above Rs. 2 crore and up to Rs.5 crore.
4.	Large enterprises	More than Rs.10 crore.	More than Rs.5 crore.

2.1.2 Distribution of industries

The distribution of industrial units across districts is presented in the following Table.

Table 2: District- wise details of industrial units registered in the Small, Medium & Large scale Sector

Sr. No.	District	No of units	Investment (Rs. in lakh)	Employment
1	Bilaspur	2350	550.018	10155
2	Chamba	1794	37.9369	6250
3	Hamirpur	2868	67.6624	10294
4	Kangra	9076	576.603	41397
5	Kullu	2574	89.4185	14206
6	Kinnaur	587	5.7087	1842
7	Lahaul& Spiti	583	3.5698	1612
8	Mandi	3962	115.002	16384
9	Shimla	3509	263.871	13388
10	Solan	5424	11594.4	108839
11	Sirmour	3322	2062.36	29751
12	Una	3463	1799	21337

[1] http://admis.hp.nic.in/himachal/industry/indstatus.htm

Total	39512	17165.55	275455

Source: Source: Department of Industries, Himachal Pradesh

The average investment per factory/unit is only ₹ 0.4 lakh indicating that most of the units are small scale. The average worker per unit is less than 7 persons.

2.1.3 Employment

The industry sector provides employment for 2.91 lakh persons in the state as of 2012[2] (GoHP 2013), while the industry department shows that the total number of industrial workers was 2.75 lakhs. Baddi-Barwala-Nalagarh belt of Solan district, located near the border of Punjab is the largest industrial zone in the state. The Census 2011 finguires indicate that about 58,719 workers were engaged in household industries and 12,63,603 workers were engaged in other activities, most of them engaged in tertiary sectors

2.2 Key Industrial Sectors

Himachal Pradesh has diverse group of industries. The large and medium industry sector had a total of 654 factories and employed about 33,000 people in 2004-5. The industry is shifting towards Pharma and IT sector over the last decade.

Table 3: Industry Group-wise Number of large and Medium Factories and Workers in Manufacturing Sector of Himachal Pradesh (2004-2005)

Ind. Code	Industry Description	Factories	% of Factories	Workers	% of workers
15	Food Prods. & Beverages	97	15%	2,694	8%
16	Tobacco Products	10	2%	634	2%
17-18	Textiles	44	7%	10,909	32%
19	Leather & Leather Prods	12	2%	688	2%
20 & 36	Wood & Wood Prods.	14	2%	137	0%
21-22	Paper & Paper Prods.	48	7%	1,263	4%
24	Chemicals & Chemical Prods.	101	15%	3,694	11%
25	Rubber & Plastic Prods.	50	8%	541	2%
26	Other Non-Metallic Mineral Prods.	33	5%	2,716	8%
27-28	Basic Metals & Fabricated Metal, excl. Machinery & Equip.	55	8%	2,213	7%
29-30	Machinery & Equip. and Accounting & Computing Machines. n.e.c	78	12%	3,184	9%
31-32	Electric Machinery, Communication & Apparatus n.e.c	59	9%	2,790	8%

[2] GoHP2013: Statistical Outline of Himahcal Pradesh, 2012-13 Department Of Economics & Statistics. Govt of Himachal Pradesh, Shimla.

Ind. Code	Industry Description	Factories	% of Factories	Workers	% of workers
33	Medical, Precision & Optical Instruments	21	3%	1,259	4%
34-35	Transport & Equipment	16	2%	543	2%
99	Others	16	2%	487	1%
Total		**654**	**100%**	**33,752**	**100%**

Source Indiastat Website: n.e.c: Not elsewhere classified

The above table shows that industry during 2004-5 period was dominated by chemical products (mostly Pharma and other chemicals), food products. The small industries employ much higher number of persons.

2.3 Industrial Regions & Concentrations

The industries in Himachal Pradesh are concentrated in the districts bordering the Indus plains neighboring Punjab state. The distribution of industries and workers across the districts is presented in the following Table 4.

Table 4: District-Wise Number of Factories & Workers (2012-13)

No.	Districts	Factories			Workers*		
		2010	2011	2012	2010	2011	2012
1	Bilaspur	96	98	98	4,402	4,552	4,552
2	Chamba	73	77	77	1,459	1,659	1,659
3	Hamirpur	194	194	194	772	772	772
4	Kangra	438	451	459	7,535	8,885	9,275
5	Kinnaur	4	5	5	882	1,382	1,382
6	Kullu	181	184	189	2,083	2,283	2,463
7	L-Spiti	-	-	-	-	-	-
8	Mandi	171	172	172	3,565	3,665	3,665
9	Shimla	167	169	173	6,259	6,359	6,609
10	Sirmaur	460	534	610	35,954	40,834	46,373
11	Solan	**1,952**	**2,109**	**2,275**	**1,67,716**	**1,81,066**	**1,94,916**
12	Una	213	237	256	14,297	17,537	19,467
H.P. State Total		**3,949**	**4,230**	**4,508**	**2,44,944**	**2,68,994**	**2,91,133**
* Average							

Source: Statistical outline of Himachal Pradesh 2012-13

More than half of the factories and nearly two thirds of the industrial workers are based in the Solan district. Specific to industrial belts are Baddi-Barotiwala-Nalagarh(BBN), Mehatpur, , Kala-Amb and Paonta Sahib. The district wise distribution of the industrial areas and industrial estates in the state is presented in the following Table 5.

The Solan district has the highest number of industrial areas followed by Kangra. Solan was the center of brewery industries since Pre-Independence period, but now the focus of industrial development has shifted to BBN belt. This region is located in the Shiwalik region with flatter landscape and better connectivity with the neighboring states. Being located in the lower altitude, flatter valleys of Shiwalik region, and this region is less prone to major landslides. Also this area does not get snow fall.

Table 5: District Wise Distribution of the Industrial Areas and Industrial Estates

District	Name of Industrial Area	Name of Industrial Estate
Bilaspur	1. Bilaspur	
	2. Golthai (Integrated Infrastructure Development Centre-IIDC)	
Chamba	1. Hatli	1. Shivnagari (Holi)
	2. Garnota	2. Sultanpur
		3. Parel
Hamirpur	1. Hamirpur	1. Agwin Buhli
	2. Nadaun	2. Khiahlohakhrian
Kangra	1. Nagrota Bagwan	1. Kangra
	2. Dhaliara	2. Dehra
	3. Nagri	3. Jawali
	4. Sansarpur Terrace	
	5. Bain Attarian	
	6. Badhal	
	7. Raja Ka Bagh	
	8.Nargala Jawali	
Kullu	1. Shamshi	
Kinnaur	1. Reckong Peo	
Lahaul & Spiti		1. Keylong
Mandi	1. Ratti	1. Saiglu
	2. Bhambla	2. Palli
	3. Sauli Khad (Mandi)	
Shimla	1. Shoghi	1. Raighat
	2. Maindli	2. Pandranu
	3. Jais	3. Sunda Bhonda
	4. Jubber Hatti	
	5. Duttnagar	
Sirmaur	1. Kala Amb	
	2. Paonta Sahib	
Una	1. Tahliwala	
	2. Gagret	
	3. Mehatpur	
	4. Amb	
	5. Jeetpur Bheri	
	6. Basal	
Solan	1. Baddi	1. Parwanoo
	2.EPIP Baddi (Ph-I &II)	2. Chambaghat
	3. Barotiwala	3. Dharampur
	4. Chambaghat	
	5. Banalagi	
	6. Mamlig	
	7. Katha Bhatoli Kalan	
	8. Vakanaghat	
	9. Lodhi Majra	
	10. Majhol	
Total	42	17

Chapter 3: Industrial hazards in Himachal Pradesh

3.1 Himachal Pradesh: Classification of Districts by Industrial Hazard Category

Based on pollution potential, the industries classified by Ministry of Environment & Forests, Govt. of India under Central Action Plan under Schedule – VIII, (Rules 3(2) and 12) [3].As per this classification, "Red" represents highly polluting industries, 'Orange' represents moderately polluting industries and 'Green' represents marginally polluting units. This classification helps the people to understand pollution potential of the industry as well as to prioritize plans and programmes of pollution control and surveillance. The number of industries in different categories in small medium and large industries are presented in the following Table 6.

Table 6: Type of Industries Based on Size and Pollution Categories

Pollution Potential Category	No. of industries by Size class				% of industries in each Size class		
	Large	Medium	Small	Total	Large	Medium	Small
Green	107	119	2,758	2,984	23%	24%	44%
Orange	154	198	2,692	3,044	33%	40%	43%
Red	200	182	805	1,187	43%	36%	13%
Total	461	499	6,255	7,215	100%	100%	100%

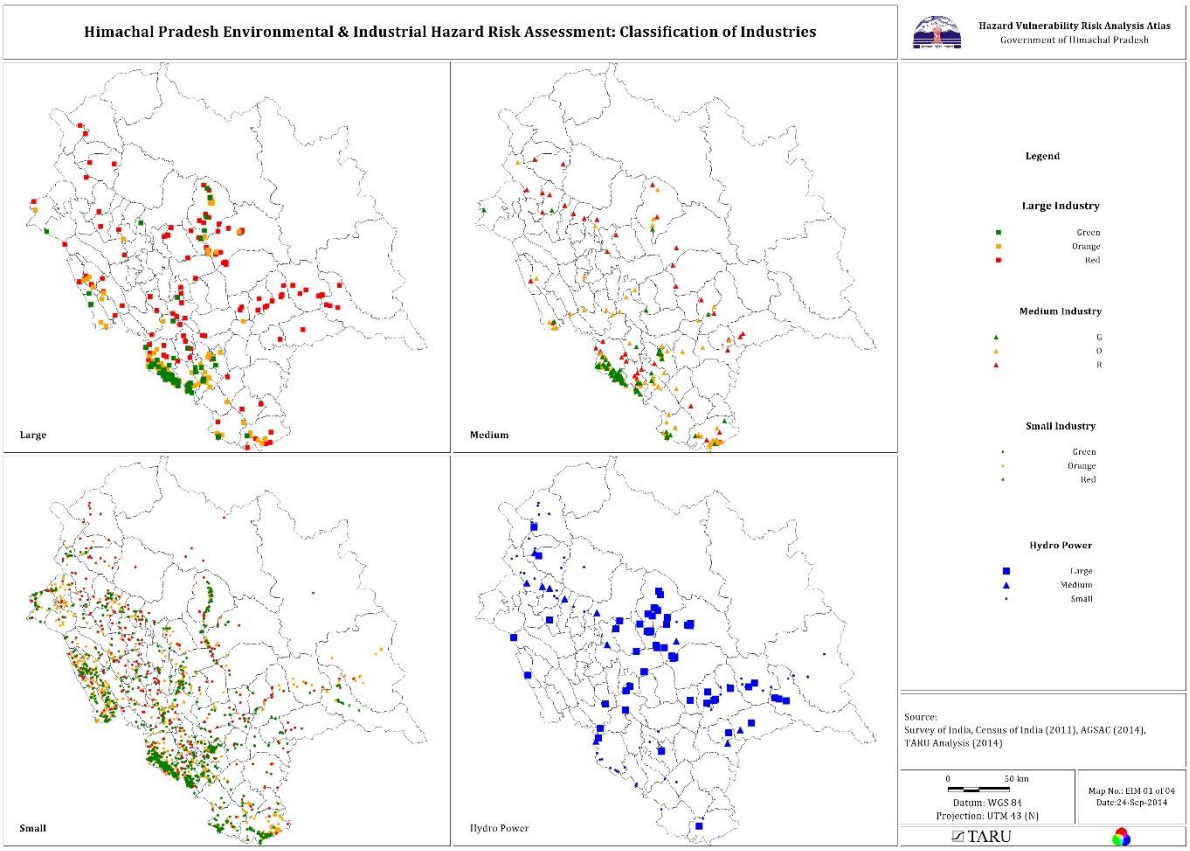
Source: AGSAC 2014

The above table shows that only about a 43% large, 36% of medium and industries and 13% of small industries are categorized under the Red category. This classification only indicates the pollution potential and does not classify industries based on hazards.

Except for eight Major Accident hazard (MAH) industries, no other industry classification based on hazards is available. The following map shows the distribution of different categories of Industries across the state.

[3] http://envfor.nic.in/legis/ucp/ucpsch8.html

Figure 1: Distribution of Industries across size and Pollution Categories



Source: AGISAC GIS data 2014, TARU Analysis 2014

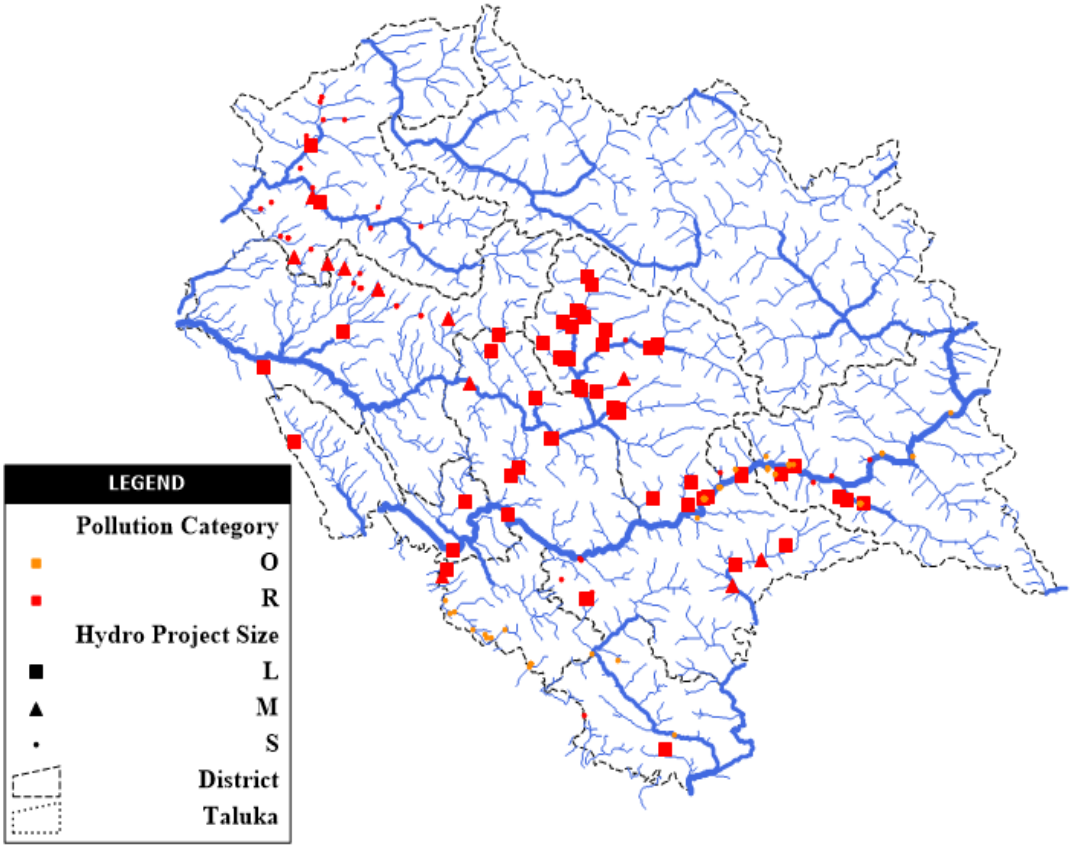
The map shows that a significant proportion of the Red industries across size classes are located in the middle and upper Himalayan region. About 40% of all the Red industries are accounted by hydroelectric project, Construction related industries (construction, Stone crushers) and Cement and mining industries.

3.1.1 Hydroelectric Projects

Himachal Pradesh has considerable hydroelectricity potential and over last two decades several private and government funded hydel projects have been commissioned in the state. The state has about 21,244 MW of hydel power potential in five perennial river basins (Satluj, Beas, Ravi, Chenab and Yamuna) About 3934.74MW is harnessed so far. Earthquakes, Flash floods, GLOFs are major risks to the hydroelectric projects in the state. The Hydroelectric projects are categorized as Red category due to potential landslides risks from construction and tunneling activities as well as increased sediment load in the rivers from dumping of debris.

There are about 196 hydroelectricity related project sites (dams, power houses and downstream discharge sites), out of which 132 sites are categorized under Red class. Rest are other downstream facilities classified as Orange. The following map presents the hydroelectricity related sites in the state.

Figure 2: Hydro-electric project sites across size and Categories



Source AGSAC Data 2014; TARU Analysis (2014)

3.1.2 Major Accident Hazard Industries

As per Department of labor and welfare, there are only 8 MAH industries in the state. The list of these are provided in the Annexure The following map shows the location of these industries and 5 km and 10 km buffer areas of these industries.

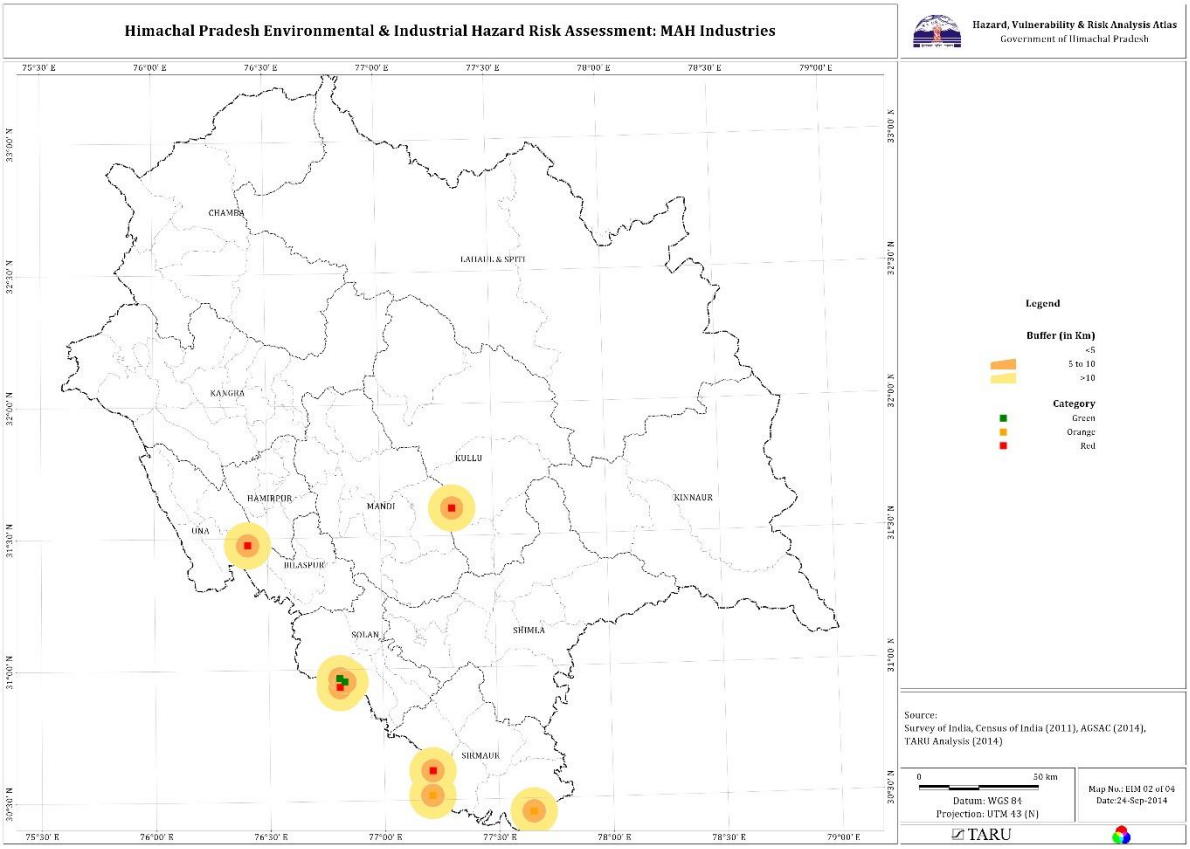
Table 7: Estimated area and Population (2011) in Buffer Zones of MAH Industries

District	Estimated Population (2011)		Estimated area (sq. km)	
Km>	5 km	10 km	5 km	10 km
Bilaspur	-	9,219	1.5	48.9
Hamirpur	-	18,052	1.8	52.5
Kullu	11,208	32,005	53.4	185.4
Mandi	5,599	20,534	24.5	126.3
Sirmaur	44,231	1,02,747	176.5	497.7
Solan	37,499	70,523	107.3	289.5
Una	8,591	47,578	74.8	199.0
Grand total	1,04,846	2,95,563	439.7	1399.4

Source: AGSAC, Dept. of Labour& Employment, TARU Analysis

The above table shows that Sirmaur district has the highest area and population under risk from any MAH industry related accidents with three MAH industries located in the district. It is necessary to do detailed risk studies to design mitigative and emergency measures.

Figure 3: Location of MAH Industries



3.2 Disaster History

Industries in Himachal Pradesh are rather new and most of them, except pharma and chemical industries do not store or use large amount of Accident/hazard prone chemicals. Due to fragile ecosystem and uncertain rainfall and risks of landslides and flash floods, the Hydel projects are some of the risk-prone industries. The disaster risk from natural events are analysed in respective hazard risk sections. The primary study of industries did not provide major disaster events based on recollection. Out of the 143 industries contacted only 40 respondents could recall any event casing impacts on their industries.

Table 8: Events Reported by the Industry Respondents

Type of event	No of respondents reporting events	% of respondents reporting events	Reported Work days lost	Average work days lost/year/industry*
Cold wave / snowstorm	3	2%	75	0.03
Drought	5	3%	185	0.06
Earthquake	3	2%		0.00
Floods	9	6%	134	0.05
Hailstorm	3	2%	0	0.00
Landslide / Roadblock	7	5%	12	0.00
Torrential rain / cloudburst	10	7%	98	0.03
Total	40	28%	504	0.18
* considering all sampled industries and 20 year recall period, Sample size 143 respondents.				

Source: TARU Analysis 2014

Torrential rains/cloud bursts were reported by 6% of the respondents and floods were reported by 6% of the respondents. As most of the industries. In most cases the direct risk of flood damage is lower, but road access gets affected by the floods and torrential rains. A significant number of industries located in Shiwalik zone and this region has short streams clogged with sediments, and flash flood risks are high to orographic extreme rain events.

Since drought affects the agro industries and Himachal faces recurrent droughts, the raw material shortage from droughts is an issue for agro industries. None of the respondents recollected any other disasters chemical disasters. Minor industrial fires are reported from time, but unless formal mechanisms for recording these events are implemented it is not possible to collect the time series information at state and district level.

3.2.1 Industrial fatalities and Casualties

The secondary data on fatality from industrial disasters from the Directorate of Labor and Employment for three years is presented in the following table. With over 3 lakh persons engaged in Industry sector, the fatality figures are about 4 persons/Lakh persons/year and casualty figures are of the order of 12 persons//lakh persons/year

Year	No. of fatal accidents	No. of persons died in fatal accidents	No. of non-fatal accidents	No. of persons injured in non-fatal accidents	Total no. of Accidents	Total no. of persons died & injured
2008	6	6	5	5	11	11
2009	10	19	9	32	19	51
2010	3	11	3	5	6	16

Source: Directorate of Labor and Employment, Govt. of Himachal Pradesh

3.3 Environmental impacts

The population located neighboring regions can be impacted by any disaster occurring in the large industries. These may be due to loss of livelihoods from disasters like earthquakes, or direct impacts of air pollution or water pollution.

An estimate was done suing GIS methods to estimate the potential population directly or indirectly impacted by the large industries. The results are presented in the following Table;

Table 9: Estimated Area and Population at Different Distances

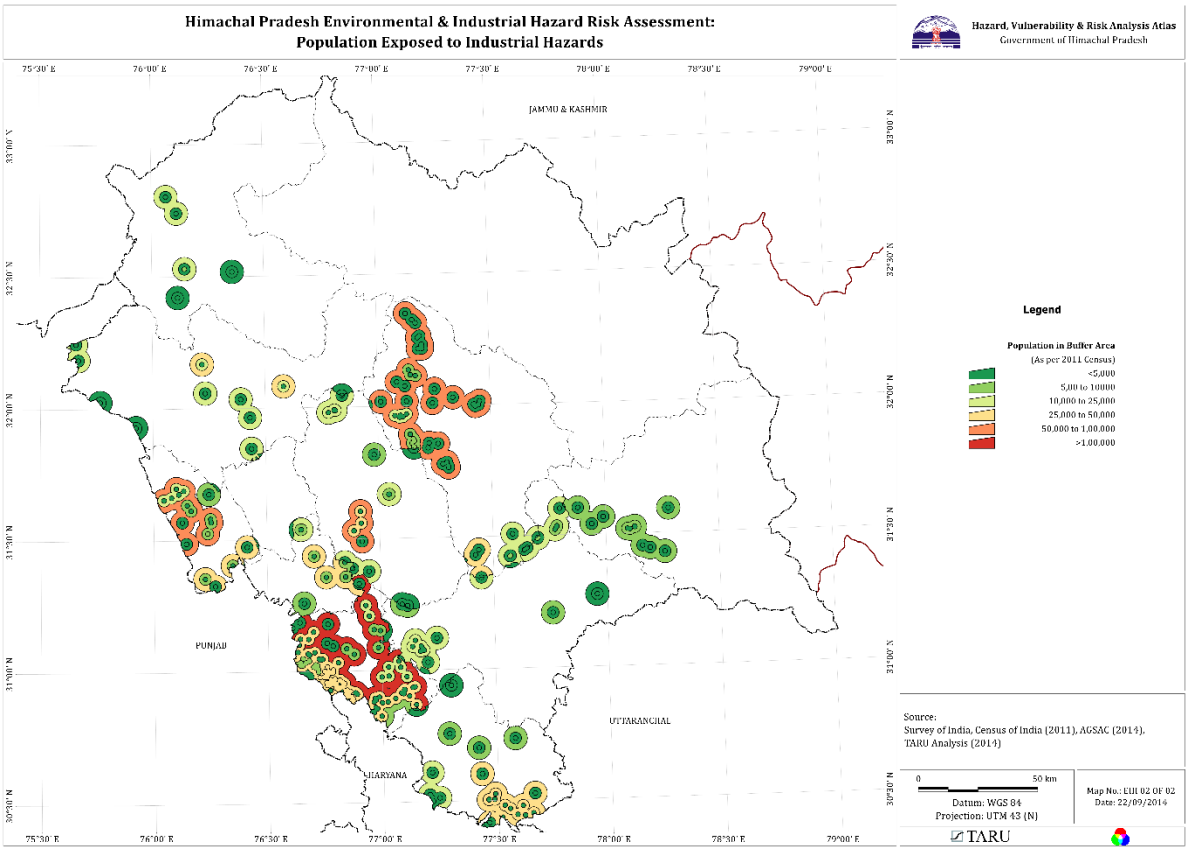
District	Area Buffer (Km.)			Estimated Population (2011) At Different Distance		
	1	2.5	5	1	2.5	5
Bilaspur	21	100	286	12,466	34,835	97,648
Chamba	16	82	286	5,938	9,250	35,635
Hamirpur	-	-	15	-	-	3,295
Kangra	32	146	492	13,053	49,772	1,58,672
Kinnaur	31	139	394	4,990	17,024	21,890
Kullu	131	463	1051	29,688	56,567	1,22,464
Mandi	40	190	499	15,824	78,593	1,31,730
Shimla	48	194	545	17,487	45,817	84,158
Sirmaur	65	259	615	31,701	58,603	99,169
Solan	269	585	699	1,07,810	1,48,083	1,33,120
Una	54	227	516	26,105	84,566	1,68,706
Grand total	705	2386	5398	2,65,062	5,83,110	10,56,487
Note: Indicative estimates only based on buffers.						

Source: AGSAC, TARU Analysis (2014)

A total of about 10 lakh population are located within a buffer area of the large industries and part of its population may be affected in worst case scenarios. The 1 km radius is a more probable population that can be affected by major industrial disasters. We have not accounted for upstream and downstream locations in this exercise. More detailed primary studies may be necessary and also modelling of disaster impacts.

The following map presents the buffer areas and Population on Buffer areas (1, 2.5 & 5 km) of large industries in HP.

Figure 4: Population in Buffer Areas of Large Industries



Source: AGSAC 2014, TARU analysis

The map shows that BBN area of Solan and Kullu district has higher number of people residing within the large industry's contiguous buffer areas. In actual numbers, Sirmaur has higher population within 5 km buffers, but they are located discontinuous areas.

3.4 Regulatory structure & governing legislation

There are various Laws and Legislations, which govern the manufacturing, processing and storage facilities in India. These Acts and Rules are listed below:

Acts

- The Factories Act, 1948, as amended in 1976 and 1987
- The Environment (Protection) Act, 1986
- The Public Liability Insurance Act, 1991 as amended in 1992
- The National Environment Tribunal Act, 1995

Rules

- Model Rules under the Factories Act, 1948 as amended in 1995
- The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 as amended in 1994
- The Public Liability Insurance Rules, 1991 as amended in 1992
- Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996

The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 prepared by the Government of India compliments the set of rules on accident prevention and preparedness notified in 1989, under the Environment (Protection) Act 1986, entitled

"Manufacture, Storage and Import of Hazardous Chemicals Rules". This envisages a 4-tier crisis management set up at the Local, District, State and Central levels.

The rules provide for the establishment of a statutory Crisis Groups in all districts and States, which have Major Accident Hazard (MAH) installations. The rules define a major accident hazard installations to include industrial activity, transport and isolated storage at sites handling hazardous chemicals in specified quantities.

The primary responsibility for dealing with chemical and nuclear emergencies lies with the following agencies:

Government of India

- Ministry of Environment and Forests is the nodal ministry for chemical accidents.
- Crisis Management Group, Department of Atomic Energy is the nodal agency for atomic accidents.

Government of Himachal Pradesh

- Department of Labor and Employment
- State Pollution Control Board

There is no Directorate of Industrial safety and Health in Himachal Pradesh and with increasing industrialization it is necessary to set up this department in the state.

Chapter 4: Conclusions

Even though Himachal Pradesh state had a history of industries (breweries and other food industries) going back to 1850's, the industrial growth has a short history of only couple of decades. Most of the industries are located in the Shiwalik zone with both earthquake as well as flood risks. The state does not have Directorate of Industrial Safety and Health. As a result data on disasters, fatalities etc. is not sufficiently managed. The data on industries, disaster history is poor and needs to be significantly improved.

The primary studies indicate that torrential rains, floods and droughts are the main issues cited by the industry representatives. The indirect damage from these events are emphasized. Most the industries are located fairly safe areas from floods, except in a few cases.

There are eight MAH industries. Risk modeling is necessary to identify the likely impact area under different meteorological conditions. The detailed study is beyond the scope of this study and also data on individual tanks, storage patterns, past event history etc. are necessary to model the area of impact as well as likely population in the risk area.

Annexes

List of MAH Industries				
Sr. No.	**District**	**Name & Address of MAH**	**Hazardous material being manufactured, handled, stored and imported**	**Maximum Inventory**
1	Solan	M/S Indian Oil Corporation Ltd. Indane Bottling plant, Plot No 1 & 1-A, Industrial Area Baddi, District Solan	1. LPG 2. LPG 3. HSD	300 MT 70MT 30 KLs
2	Solan	M/S Pidilite Industries Ltd. Village Bhatolikalan, Baddi, District Solan	1. Class A Solvents (Toluene & SBP) 2. Rubber & Resins 3. Additives	300 KL 40 MT 10 MT
3	Solan	M/S Pidilite Industries Ltd. Village Dharampur, Sai Road Baddi, District Solan	1. VAM 2. Goshanol 3. Elvanol T-25 4. Additive BBK 5. Additive 6. Silica Powder 7. Kurray 8. Additive TKD	200 KL 30 Ton 50 Ton 8.0 Ton 30 KL 3 Ton 10 Ton 8 Ton
4	Sirmour	M/S Pidilite Industries Ltd. Village Rampur Jattan Kala Amb, District Sirmour (Unit-III)	Hiol Fatty Acid Caustic Potash Lye Potassium Silicate Shivamol 813/ Napthalene Soln Polymol GH Lquid/ Napthalene Soln Sodium Lignosulphate Power Con 100 Sugar	35 MT 20 MT 30 MT 20 MT 40 MT 50 MT 20 MT 5 MT 10 MT

List of MAH Industries				
5	Sirmour	M/S Pidilite Industries Ltd. Village Johron, Trilokpur Road Kala Amb, District Sirmour, Unit - II	1. Vinyl Acetate Monomer 2. Poly Vinyl Alcohol 3. Additive 4. Hydrochloric Acid 5. Potassium per Sulphate 6. Sodium Laurel Sulphate 7. Sodium Hydroxide 8. Sodium Hypochloride 9. 2-Ethyle Hexanol 10. Sodium Benzoate 11. Sodium Bicarbonate	550 KL 80 MT 50 KL 2.5 MT 1.5 MT 100 kg. 500 kg. 100 Ltrs 170 ltrs 1.5 MT 1.5 MT
6	Sirmour	M/S Ruchira Papers Ltd. (Writing & Printing Paper unit) Trilokpur Road, Kala Amb, District Sirmaur	1. Sodium Chlorate 2. Chlorine 3. Sulphur Dioxide	40 MT 50 cylinders 10 cylinders
7	Una	M/S Indian Oil Corporation Ltd. Indane Bottling plant, Raipur Sahoran, Mehatpur,	LPG HSD	900 MT 20 KL
8	Kullu	M/S Indian Oil Corporation . Ltd. Petroleum Bulk Depot .	MS HSD SKO	440 KL 1110 KL 1110 KL

Source: Deptt. of Labour and Employment, GoHP

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