DIRECTORY OF WATER RESOURCES IN HIMACHAL PRADESH

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WATER RESOURCES IN HIMACHAL PRADESH

Water is one of the most vital natural resources of Himachal Predesh. The state is richly endowed with a hilly terrain having an enormous volume of water from the catchment areas of Satluj, Beas, Ravi and Chenab rivers. As such, the state has enormous potential of water resources in the form of glaciers and rivers but ground water resources are limited. The major consumptive use of water in the State has been for irrigation. The gross irrigation potential of the State is estimated to be 3.35 lakh hectare, while the irrigation potential created has reached 2.56 lakh hectare by September 2013.

Availability of Water resources

Glaciers

Glaciers are located in higher Himalayan reaches (above 4000 m) in Pir Panjal, Dhauladhar, Zanskar and Great Himalayan ranges. There are 800 Glaciers in the Himachal Himalayas which are 199 higher in number as compared to the previous report of 601 Glaciers in the state reported in the state development report in 1991. This variation is due to breaking of large glaciers into smaller ones with the increasing temperature in past two decades.

According to the investigations carried in the Himachal Himalayas, there are a total of 334 glaciers in the entire Satluj Basin which includes the information about the Beas, Sainj, Spiti, Baspa basins and 457 glaciers in Chenab basin. The total area covered by these glaciers in Satluj and Chinab basins is 2175 km^2. Besides the glaciers there are 2679 permanent snowfields in these basins with a total area of 1775.189 km^2. Out of 334 glaciers in the entire Satluj basin, 202 glaciers are located in the Himachal Pradesh.

Table 1: Basin wise Distribution of Glaciers and Snowfields in Himachal Himalayas

Basin Name	Number of Glaciers	Aerial Extent (km^2)	No. of Permanent Snowfields	Aerial Extent (km^2)
Beas	51	503.725	237	312.564
Parvati	36	450.627	131	188.188
Sainj	09	37.255	59	51.934
Spiti	71	258.237	597	368.366
Baspa	25	203.300	66	64.964
Satluj	151	616.299	857	544.173
Chenab	457	1055.27	732	245.000
Total	**800**	**3124.713**	**2679**	**1775.189**

Surface water Resources

Most of the surface water resources of the state flow from perennial rivers which originate from glaciers. The flow in these rivers is further augmented by run-off from the catchment area.

Rivers

90% of Himachal Pradesh's drainage forms the part of Indus river system. Himachal provides water to both the Indus and Ganges basins. The major river systems of the region are the Chandrabhaga or the Chenab, the Ravi, the Beas, the Sutlej and the Yamuna. These perennial rivers are fed by snow and rainfall and are protected by a fairly extensive cover of natural vegetation. The Beas (Vedic name Arjikiya and in later Sanskrit Vipasa) rises in the Pir Panjal range near the RohtangPass and flows some 256km in Himachal. The river is formed by a number of tributaries, the important being the Parbati, the Hurla, the Sainj, the Uhl, the Suheti, the Luni, the Banganga and the Chaki. The northern and eastern tributaries of the Beas are snow fed and perennial, while the southern affluent are seasonal. During August, increase in inflow sometimes results in floods. The Chandrabhaga or Chenab (Vedic name Askni), the largest river (in volume of water) is formed after the meeting of 2 streams, Chandra and Bhaga at Tundi, in Lahul. It flows 122kms and has a catchments area of 7500sq.km. in Himachal, before entering Kashmir. The Chandra passes through barren land where there are no signs of life. The Ravi (Vedic name Purushni and in later Sanskrit Iravati) is born in Bara Banghal, Kangra district as a joint stream formed by the glacier fed Bhadal and Tantgari. The river has a length of about 158km and has a catchment area of about 5451km. Chamba lies on its right Bank. The Sutlej (Vedic name Saturdi and in later Sanskrit Shatadru) originates in distant Tibet. It cuts through both the great Himalayan and the Zaskar ranges and crosses the Indo-Tibetan border near Shipkila. Then the river Spiti joins it from the north. Passing through precipitous gorges and narrow valleys it emerges from the mountains at Bhakra. The catchment area of Sutlej in Himachal is 20,000sq.km. The Yamuna has its origin in Yamunotri in Uttar Kashi (Uttar Pradesh). Its total catchment area in Himachal is 2320sq.km. Its main tributaries are the Tons, the Giri and the Bata.

Lakes

There are a number of small and large lakes in Himachal Pradesh. Most important representing the water budget for the state are 21. Details of these lakes is as follows:

Table 2: Major Lakes of Himachal Pradesh contributing as a water resorvior.

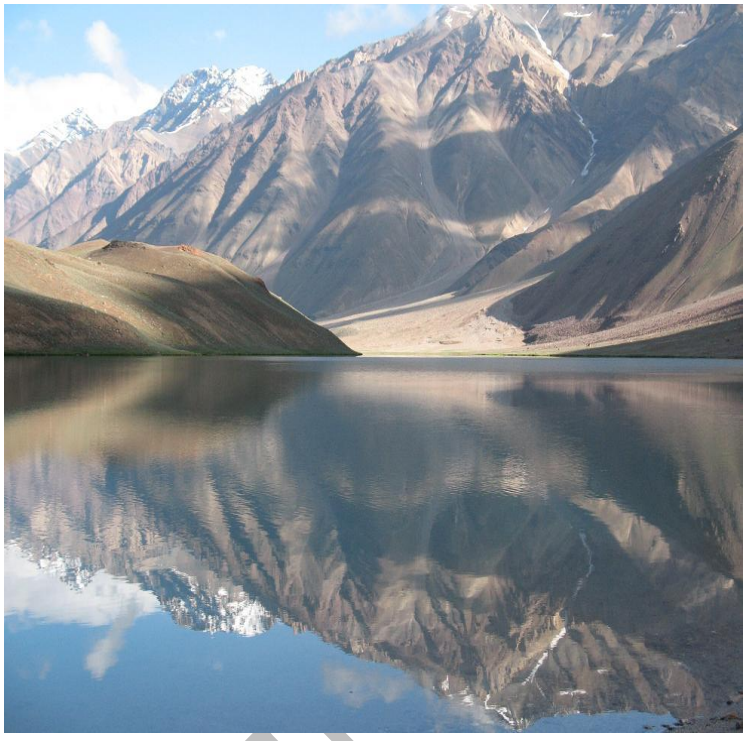
Sr. No.	Name of Lake	District	Altitude	Area/hectare
1.	Bhrigu	Kullu	4240	3
2.	Dashair	Kullu	4200	4
3.	Mantalai	Kullu	4160	3
4.	Seruvalsar	Kullu	3301	0.5
5.	Prashar	Mandi	2600	1
6.	Rewalsar	Mandi	1320	3
7.	Nako	Kinnaur	3604	1
8.	Chandertal	Lahul-Spiti	4280	49
9.	Surajtal	Lahul-Spiti	4800	3
10.	Chandernaun	Shimla	3960	1
11.	Dal	Kangra	1840	2
12.	Kareri	Kangra	2960	3.5
13.	Pong Dam	Kangra	430	21712
14.	Mani Mahesh	Chamba	4200	2
15.	Gauri Kund	Chamba	4000	0.5
16.	Khajiar	Chamba	1920	5
17.	Lam Dal Lake	Chamba	3640	5
18.	Gadhasaru	Chamba	4280	1
19.	Mahakali	Chamba	4355	2
20.	Khundi Maral	Chamba	3750	3
21.	Renuka	Sirmaur	600	15

Ramsar Wetlands

1. Chandra Taal (meaning the *Lake of the Moon*)

Chandra Tal is situated at an altitude of about 4,300 metres (14,100 ft) in the Himalayas. Mountains of scree overlook the lake on one side, and a magnificent cirque presents a view on the other. The name of the lake originates from its crescent shape. Situated in the Spiti part of the Lahul and Spiti district of Himachal Pradesh, Chandra Taal is a popular destination for trekkers and campers.

The lake is accessible on foot from Batal as well as from Kunzum Pass from late May to early October. There is also a motorable road from Batal which is 16 km (9.9 mi) away from Chandra Taal, but before August, its condition can be bad. The road from Kunzum Pass is accessible only on foot, and it is about 8 km (5.0 mi) from Chandra Taal. Vast meadows on the banks of the lake are the camping sites. During springtime, these meadows are carpeted with hundreds of kinds of wildflowers.



The most surprising thing about this lake is that there is no visible source of this lake but there is a visible outlet of this lake which means that water to this lake comes from underground. The lake is situated on the Samundra Tapu plateau, which overlooks the Chandra River. The lake is one of two high-altitude wetlands of India which have been designated as Ramsar sites.

2. Renuka Wetland

It is located 173 km Southwest of Shimla in Sirmaur District at an altitude of 660 m above msl. Due to biological richness, the National Wetland Management Committee has designated it a wetland of national importance. There has been great concern about the ecological deterioration, habitat degradation and eutrophication of wetland due to silting, high level of organic pollution, dumping of non biodegradable materials by

pilgrims and tourists. This has not only resulted in habitat deterioration, shrinking of the aquatic life, but also the terrestrial fauna of Renuka Sanctuary as this is the only perennial source of water for wild animals.

3. Pong Dam

Pong Dam is situated at district Kangra and the bank of Beas river along boundary of Himachal and Punjab states. It is situated at $31^0$58'57"N and $76^0$03'33"E 430m above msl in Kangra District with an area of 21712 hectare. It is a water storage reservoir. At highwater level maximum depth exceeds 59 m and low water level a muddy shore line upto 100 m. The reservoir contains several large islands.

Groundwater Resources

The groundwater resources occur mainly in unconsolidated sediments of intermontain valleys and in the submontane tract. Kangra, Una, Hamirpur, Bilaspur, Mandi, Solan and Sirmaur districts, particularly their valley areas depend upon groundwater. The exploitation is done through open wells, tubewells, infiltration galleries and wells.

Table 3: The status of development of groundwater resources in the state

Total replenishable groundwater resources	**0.036 m ham/yr**
Provision for domestic, industrial and other uses	0.007 m ham/yr
Available net groundwater resources for irrigation	0.029 m ham/yr
Net draft	0.005 m ham/yr
Balance groundwater resources for future use	0.024 m ham/yr
Level of groundwater development	18.18 %
Utilisable irrigation potential by groundwater development	65,500 ha

Traditional water sources

As there is an imbalance between the supply and consumption of water, particularly by the poor and weaker sections of the society, the traditional sources of water play a significant role. These include springs, *Khuls, Baories*, Ponds, *Khaties* and ditches particularly in Himachal Pradesh. These systems supplement the water requirements of the rural and urban areas. There are 10512 traditional sources of water in the state for rural habitations.

Table 4: Traditional water structures and their uses

Structure	Use
Chappri/Talaai/Talaab	Livestock/irrigation
Baori/Khatri	Domestic water use
Naun	Bathing & washing clothes
Chharedu/Panihar/Nahun	Bathing, drinking water
Kuhl	Irrigation & operating *gharats*
Gharat	Milling

Traditional water sources of Himachal Pradesh

State council for science technology and environment has done a survey in 169 Panchayats of seven districts in the state of Himachal Pradesh on traditional water sources which clearly

showing that there are only 30.41% sources which are in good working conditions and recharging properly thought the year but 69.59 % sources are not in proper working condition and nearly going to dry in near future. In Chamba district there is less than 1 % sources which were found working good and more than 99 % of them are in poor condition. Sirmaur district is again showing the similar trend slightly good from Chamba district. The conditions of these traditional sources are quite good in Solan District which is more than 53 %.

State government should look in this matter otherwise these sources will not remain functional and there may be water crisis in near future.

Table 5: District wise data of the traditional water sources (A case study done by State Council for Science Technology & Environment)

Name of Distt.	No. of Panchayats	Baories	Wells	Ponds	Spring	Others	Good Condition	Bad Condition	Total
Sirmaur	43	167	19	55	53		27	265	292
Hamirpur	10	60	58	2			54	66	120
Kullu	11	73	4	1	5	5	43	45	88
Kangra	42	338	116	20	9	141	237	387	624
Chamba	16	7	1	1	177	1	1	185	186
Shimla	29	108	22	10	5	1	38	108	146
Solan	18	133	15	16	23	1	100	88	188

Figure 1: Condition of traditional water sources in Seven Districts of Himachal Pradesh (according to the case study done by SCST&E)

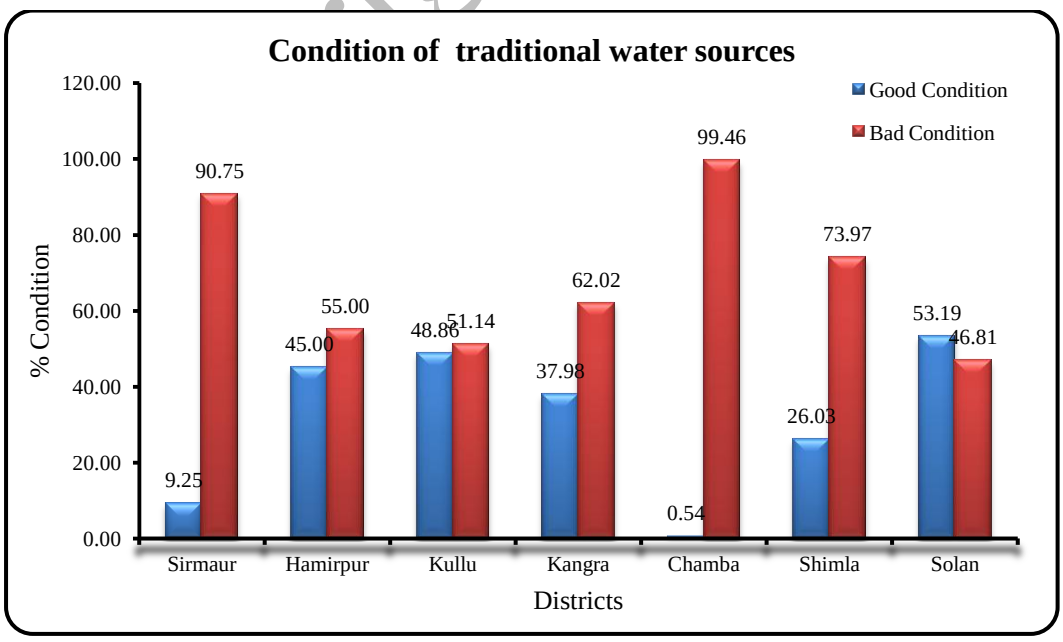


Table 6: Water sources of Himachal Pradesh

District	Ground water	Surface water	Rain Water	Traditional Sources	Others	Total
Bilaspur	827	786	0	461	0	2074
Chamba	1717	2433	3	2598	836	7587
Hamirpur	1057	485	0	231	1	1774
Kangra	1602	1317	11	1369	466	4765
Kinnaur	76	217	0	24	2	319
Kullu	0	3392	0	0	0	3392
Lahul Spiti	1	290	0	57	0	348
Mandi	833	3924	0	1483	840	7080
Shimla	233	3917	5	2518	9	6682
Sirmaur	644	2249	0	535	9	3457
Solan	344	1090	0	1215	316	2965
Una	832	123	1	21	116	1093
Total	**8186**	**20223**	**20**	**10512**	**2595**	**41536**

Source:

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2. SOER – 2012.
3. HP State Development report, Chapter 2 (Natural resources).
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5. Neetu Sharma & Promila kanwar. Indigenous water conservation System - A rich tradition of rural Himachal Pradesh. *Indian Journal of Traditional Knowledge* – Vol. 8(4), Oct. 2009, pp. 510 – 513.
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