

A. Beas Basin:

Watershed of Beas basin delineated on the basis of Cartosat Digital elevation model at the spatial resolution of 30m (Table.1)

Sr. No.	Name of Basin	Number of Major Watershed	Scale	Basin Area (Sq. Km)
1	Beas	2156	1:50000	14082

Source : Cartosat Digital Elevation Model Spatial Resolution 30 Meters)

Table.1 Beas basin

B. Working methodology:

Mapping of Beas basin were done on different aspects (Watershed, Slope, Road and slope aspect). The major source of map delineation was Cartosat at the resolution of 2.5 m. The data validations were done with the help of Google earth and Toposheets, Survey of India at the scale of 1:50000. The digital elevation model (DEM) at the resolution of 30m is also used to prepare the slope, aspect and watershed maps.

1. Road:

Road are classified in different categories such as national highway, state highway, major district road, BRO road and link road (Table.3). The maximum number of road length recorded under the categories of link road 15049.14 km. which share 90.54% of the total road length. The least area of road length was recorded under the BRO road 49.21 km, which share the 0.30 % of total road area.

Sr. No.	Type of Road	Length(Km)	Length (%)
1	National Highway	459.98	2.77
2	State Highway	494.4	2.9
3	MDR	569.93	3.43
4	BRO Road	49.21	0.30
5	Link Road	15049.14	90.54
6	Total	16622	100

Source : Cartosat-1 and Arc GIS online images)

Table.2 Road classification in Beas basin

2. Slope

Slope map was prepared on the basis of DEM at the resolution of 30 meters. The slope are categorised in 8 different classes. The maximum percentage of slope area were found under the categories types of 0-10 degree, which is 31.34 % and the lowest was found under the categories of very steep slope (>70) which was 0.02% of total slope area (Table.3)

Sr. No.	Slope	Slope Area(Sq. Km)	Slope Area (In Percentage)
1	0-10	4412.97	31.34
2	11-20	3036.24	21.56
3	21-30	2875.5	20.42
4	31-40	2393.06	16.9
5	41-50	1080.68	7.67
6	51-60	247.2	1.76
7	61-70	34.32	0.24
8	>70	2.19	0.02
Total		14082	100

(Source : Cartosat Digital Elevation Model Spatial Resolution 30 Maters)

Table.3 Slope classification in Beas basin

3. Slope Aspect

The slope aspect map of Beas basin was also prepared at DEM resolution of 30 m, The maximum slope aspect area were found under the slope aspect type of Southwest direction 2101.53 km² (14.92%) and west direction 2050.51 km² (14.56%). The least area was recorded under the slope aspect of east 1600.83 km² (11.37%) and south east 1609.65 km² (11.43%) direction.

Sr. No.	Aspect	Aspect Area(Sq. Km)	Aspect Area (In Percentage)
1	Flat	81.13	0.58
2	North	1512.23	10.74
3	Northeast	1533.95	10.89
4	East	1600.83	11.3
5	Southeast	1609.65	11.4
6	South	1887.4	13.40
7	Southwest	2101.53	14.9
8	West	2050.51	14.56
9	Northwest	1704.84	12.11
Total		14082	100

(Source : Cartosat Digital Elevation Model Spatial Resolution 30 Maters)

Table.4 Slope aspect classification in Beas basin

4. Wetlands delineation

Wetlands of Himachal Pradesh are delineated on the bases of open source data source, ESRI online Carto-sat at resolution of 2.5m. During the digitisation of wetlands, all prominent visible lakes/pound/glacier lakes are delineated. 1529, total number of wetlands/lakes/pound are identified on visible scale of 2.5m. The wetlands categories are also classified into natural and manmade. The major wetlands are also separately identified. The attribute data of wetlands includes information about their name, area, types, block and district wise distribution (Table1).

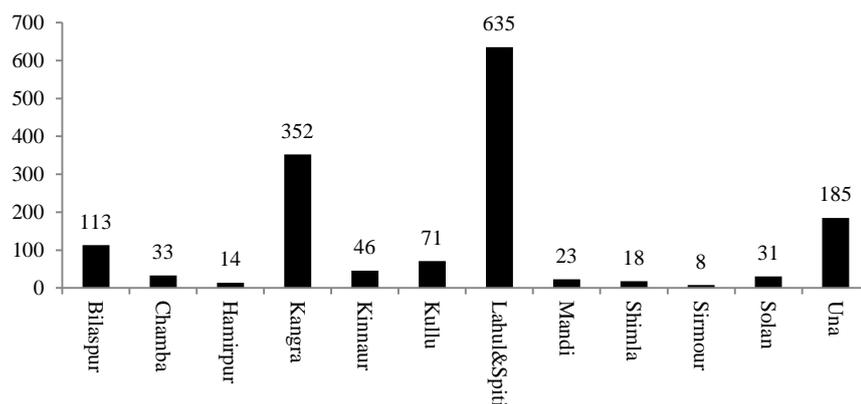


Figure.1 Identified wetlands in 2017

Maximum numbers of wetlands/lakes/pounds are recorded in the districts Lahual & Spiti (635), Kangra (352) and Una (185). The least number of wetlands/lakes/pounds are recorded in Sirmour (8) and Hamirpur (14) districts (Figure.1& Table.1).

S. No.	Types	Area in Hectare	Wetlands
1	Small	0-1	1364
2	Medium	1-10	139
3	Large	>10	26
Total			1529

Table.5 Classification of wetlands on the basis of area

The delineated wetlands are classified in to three categories on the bases of area, small (0-1 hectare), medium (1-10 hectare) and large (>10 hectare). The small wetland categories have 1364, medium 139 and large have 26 respectively. Natural wetlands share 95% part of total wetlands 1529 (Figure.2).

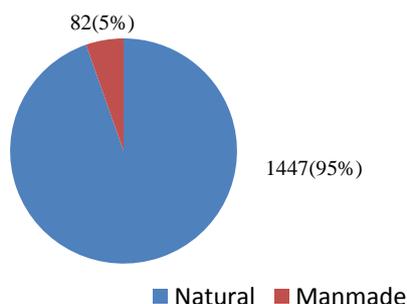


Figure.2 Natural and manmade wetlands ratio in Himachal Pradesh

5. Drainage System: Beas basin drainage system was delineated on the basis of satellite images cartosat at the resolution of 2.5 m. The drainage delineation includes all small khads, Nalas and main rivers. The total numbers 390606, drainage are delineated. The attribute information includes the some prominent khads, nalas and rivers name. The Indian Himalayas region has the dendric pattern and Sutlej basin presents the dendric pattern.

C. Methodology:

ESRI online IMS was the data source and all the water bodies (wetlands & Drainage) are delineated at the resolution 2.5m. Simply images are geo-processed in ARC GIS and features are identified (Figure.3).

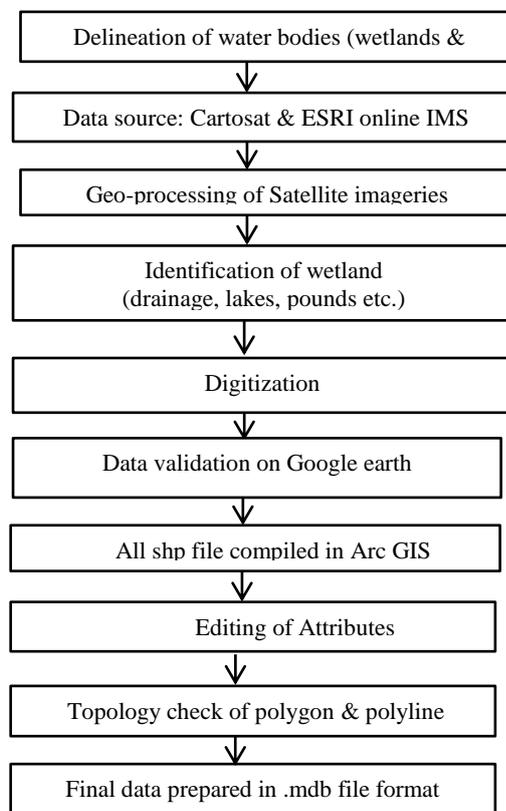


Figure.3 Methodology flow diagram