

MAPS AND STATISTICS

7.0 WETLANDS OF HARYANA: MAPS AND STATISTICS

Area estimates of various wetland categories for Haryana have been carried out using GIS layers of wetland boundary, water-spread, aquatic vegetation and turbidity. Total 1441 wetlands have been mapped at 1:50,000 scale in the state. In addition, 10529 wetlands (smaller than 2.25 ha) have also been identified. Total wetland area estimated is 42478 ha that is around 0.86 per cent of the geographic area (Table 4). The major wetland types are River/Stream accounting for 40.08 per cent of the wetlands (17025 ha), Tank/Ponds (7573 ha), waterlogged (3339 ha) and Reservoirs/Barrage (1775 ha). Graphical distribution of wetland type is shown in Figure 10.

Analysis of wetland status in terms of open water and aquatic vegetation showed that around 14216 ha and 2245 ha respectively. Lotic wetlands include rivers and major streams and contribute an area of 17025 ha. Open water in post-monsoon season is very less (3121 ha). It clearly indicates that these rivers are mainly seasonal and receives scanty rainfall. Perennial rivers are few and river flow is restricted to narrow streams of the river. Presence of aquatic vegetation is more during post monsoon season and it is mainly due to dispersion of floating vegetation by wind and water current. Aquatic vegetation occupies an area of 2245 and 1497 during post-and pre-monsoon respectively. High turbidity (3968 ha) is observed during post-monsoon season. Lakes and ponds showed low turbidity in general where as tanks/ponds located around thermal plants and industrial area showed high turbidity. Inland wetlands mainly lakes and ponds shown drastic decrease in terms of area in pre-monsoon season (20 ha) and it is due to high temperature during this season.

Table 4: Area estimates of wetlands in Haryana

Sr. No.	Wettcode	Wetland Category	Number of Wetlands	Total Wetland Area	% of wetland area	Open Water		Area in ha
						Post- monsoon Area	Pre- monsoon Area	
1100 Inland Wetlands - Natural								
1	1101	Lakes/Ponds	5	801	1.89	284	20	
2	1102	Ox-bow lakes/ Cut-off meanders	3	24	0.06	17	17	
3	1103	High altitude wetlands	-	-	-	-	-	
4	1104	Riverine wetlands	-	-	-	-	-	
5	1105	Waterlogged	76	1412	3.32	1123	819	
6	1106	River/Stream	20	17025	40.08	3121	9362	
1200 Inland Wetlands - Man-made								
7	1201	Reservoirs/Barrages	4	1775	4.18	59	175	
8	1202	Tanks/Ponds	1097	7573	17.83	6782	6344	
9	1203	Waterlogged	236	3339	7.86	2830	2175	
10	1204	Salt pans	-	-	-	-	-	
		Sub-Total	1441	31949	75.21	14216	18912	
		Wetlands (<2.25 ha), mainly Tanks	10529	10529	24.79	-	-	
		Total	11970	42478	100.00	14216	18912	

Area under Aquatic Vegetation	2245	1497
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Area under turbidity levels		
Low	6953	6423
Moderate	3295	9481
High	3968	3008

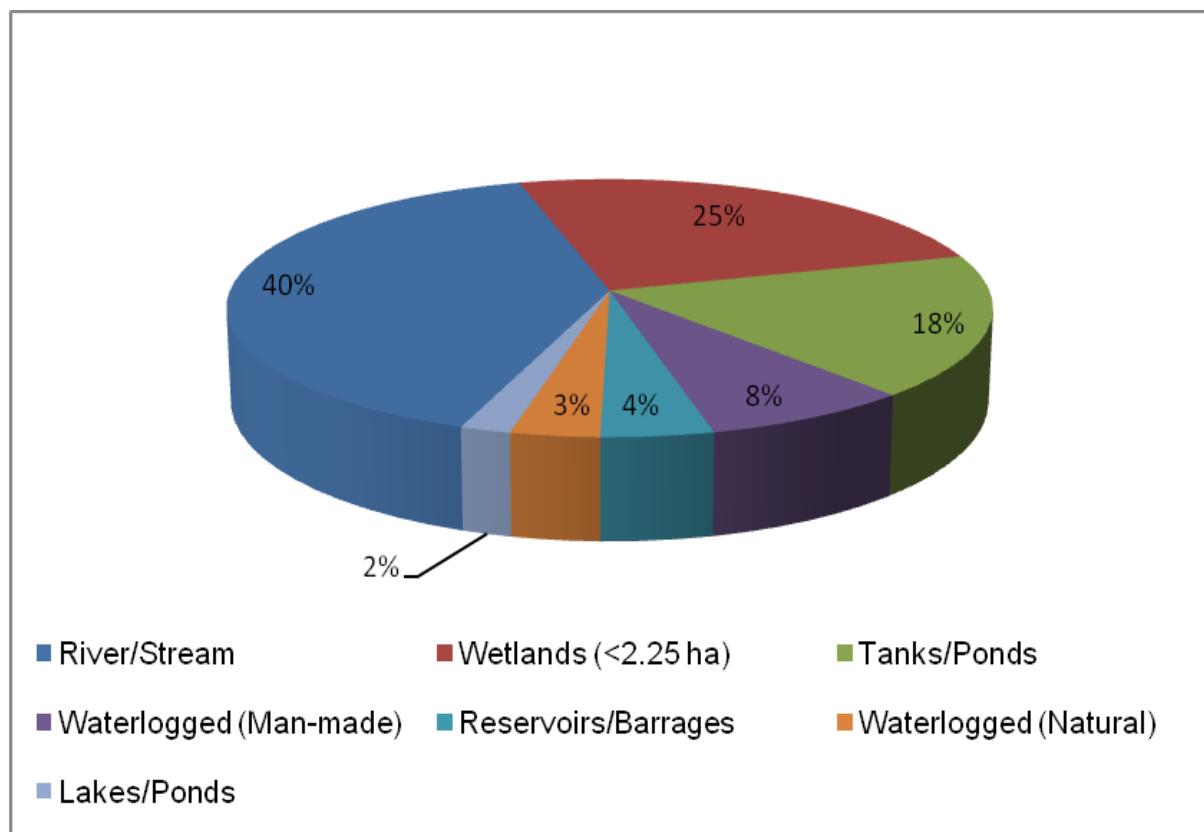


Figure 10: Type-wise wetland distribution in Haryana

7.1 DISTRICT-WISE WETLAND MAPS AND STATISTICS

The state has nineteen districts. District-wise distribution of wetlands showed that three districts could be called as wetland rich. Panchkulla has highest concentration which is around 3.53 percent of geographic area under wetland. The other two districts are: Yamunanagar and Karnal have 2.79 and 1.65 per cent area under wetland respectively. Five districts Kaithal, Fatehabad, Sirsa, and Bhiwani have least amount of wetland area. These districts are small in terms of geographic area and highly industrialized due to proximity to national capital. District-wise wetland area estimates is given in Table-5. Figure 11 shows district-wise graphical distribution of wetlands. Mahendragadh and Rewari have less wetland area.

Wetland statistics followed by wetland map and corresponding satellite data for each district is given to have a fairly good idea about the distribution pattern and density of wetlands in the district.

Table-5: District-wise wetland area

Sr. No.	District	Geographic Area	Wetland Area	% of total wetland area	% of district geographic area
		(sq. km)	(ha)		
1	Panchkulla	898	3173	7.47	3.53
2	Ambala	2385	3036	7.15	1.27
3	Yamunanagar	1756	4893	11.52	2.79
4	Kurukshestra	1217	1671	3.93	1.37
5	Kaithal	2799	1332	3.14	0.48
6	Karnal	1967	3246	7.64	1.65
7	Panipat	1754	1862	4.38	1.06
8	Sonipat	1385	2154	5.07	1.56
9	Jind	2736	2153	5.07	0.79
10	Fatehabad	2760	1539	3.62	0.56
11	Sirsa	4276	1776	4.18	0.42
12	Hisar	6279	2811	6.62	0.45
13	Bhiwani	5099	1748	4.12	0.34
14	Rohtak	4411	1683	3.96	0.38
15	Jhajjar	1834	2194	5.17	1.20
16	Mehendragarh	1683	442	1.04	0.26
17	Rewari	1559	442	1.04	0.28
18	Gurgaon	2105	2764	6.51	1.31
19	Faridabad	2760	3559	8.38	1.29
	Total	49663	42478	100.00	

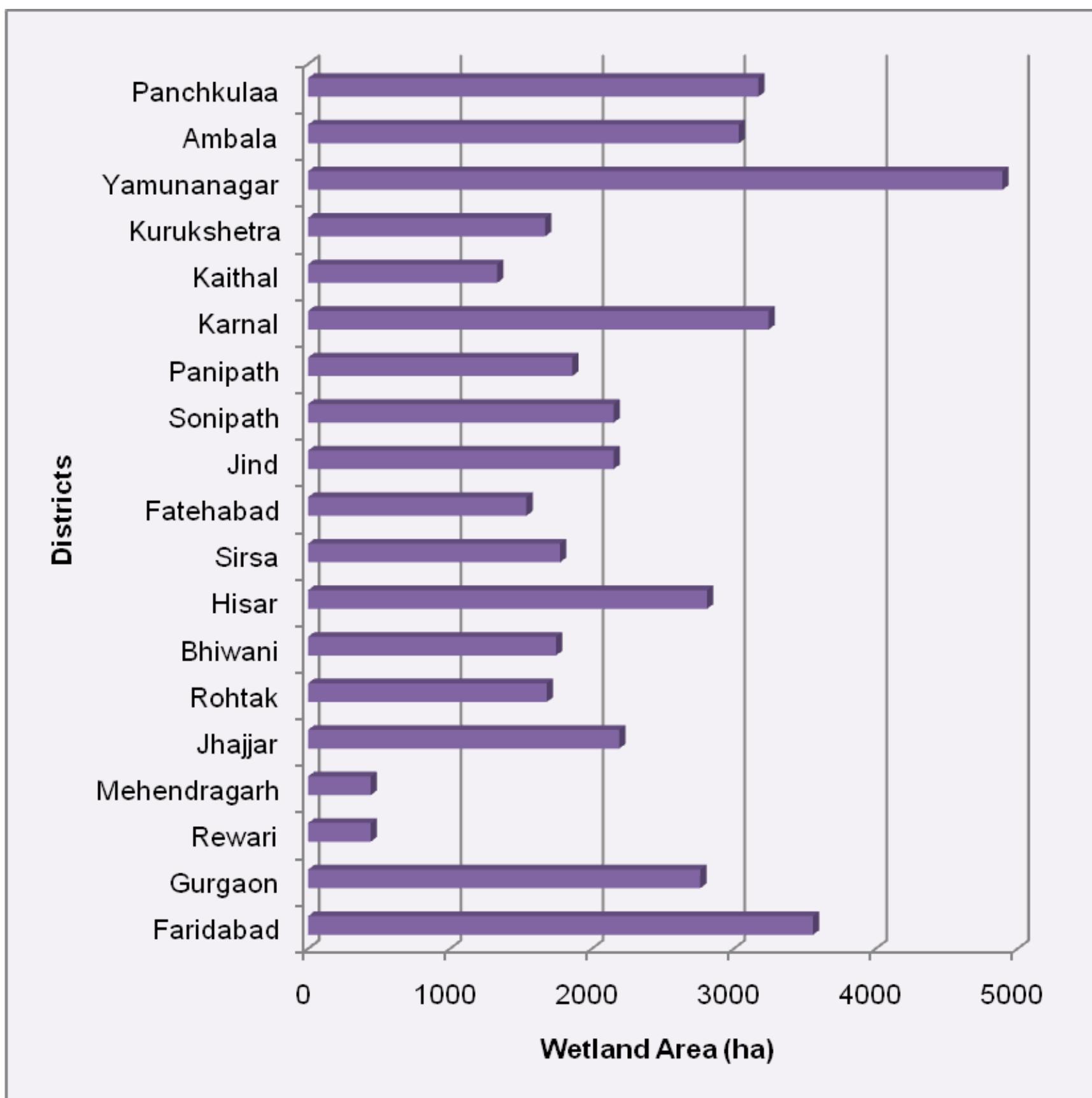
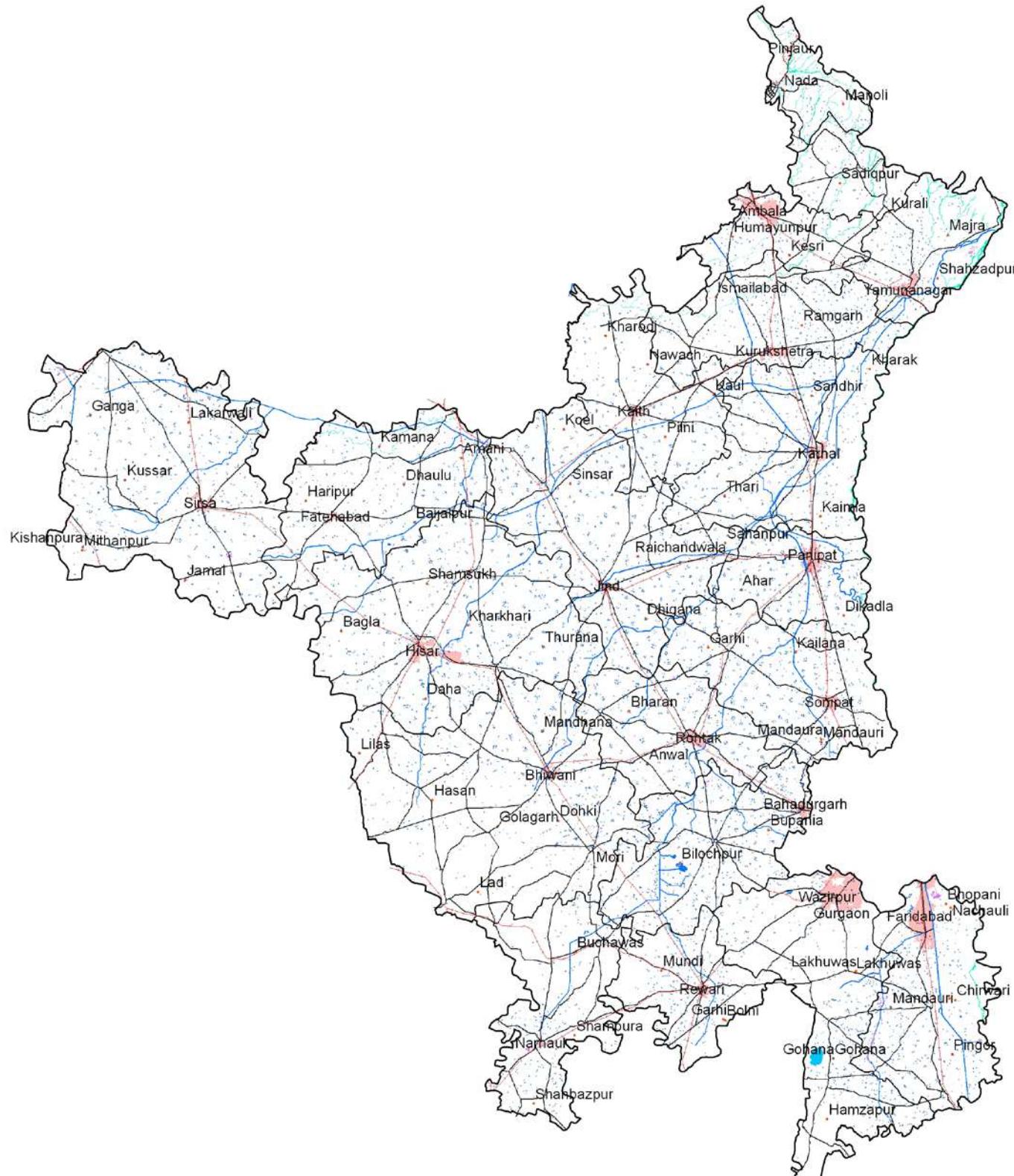


Figure 11: District-wise graphical distribution of wetlands

State : Haryana

WETLAND MAP

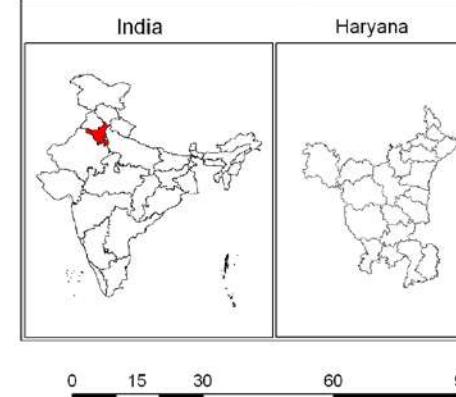


Symbol	Typecode	Level I	Level II	Level III
		Inland Wetlands		
			Natural	
	1101		Lakes/Ponds	
	1102		Ox-bow lakes/ Cut-off meanders	
	1103		High altitude wetlands	
	1104		Reverine wetlands	
	1105		Waterlogged	
	1106		River/Stream	
			Man-made	
	1201		Reservoirs/Barrages	
	1202		Tanks/Ponds	
	1203		Waterlogged	
	1204		Salt pans	
		Coastal Wetlands		
			Natural	
	2101		Lagoons	
	2102		Creeks	
	2103		Sand/Beach	
	2104		Intertidal mud flats	
	2105		Salt marsh	
	2106		Mangroves	
	2107		Coral reefs	
			Man-made	
	2201		Salt pans	
	2202		Aquaculture ponds	

Legend

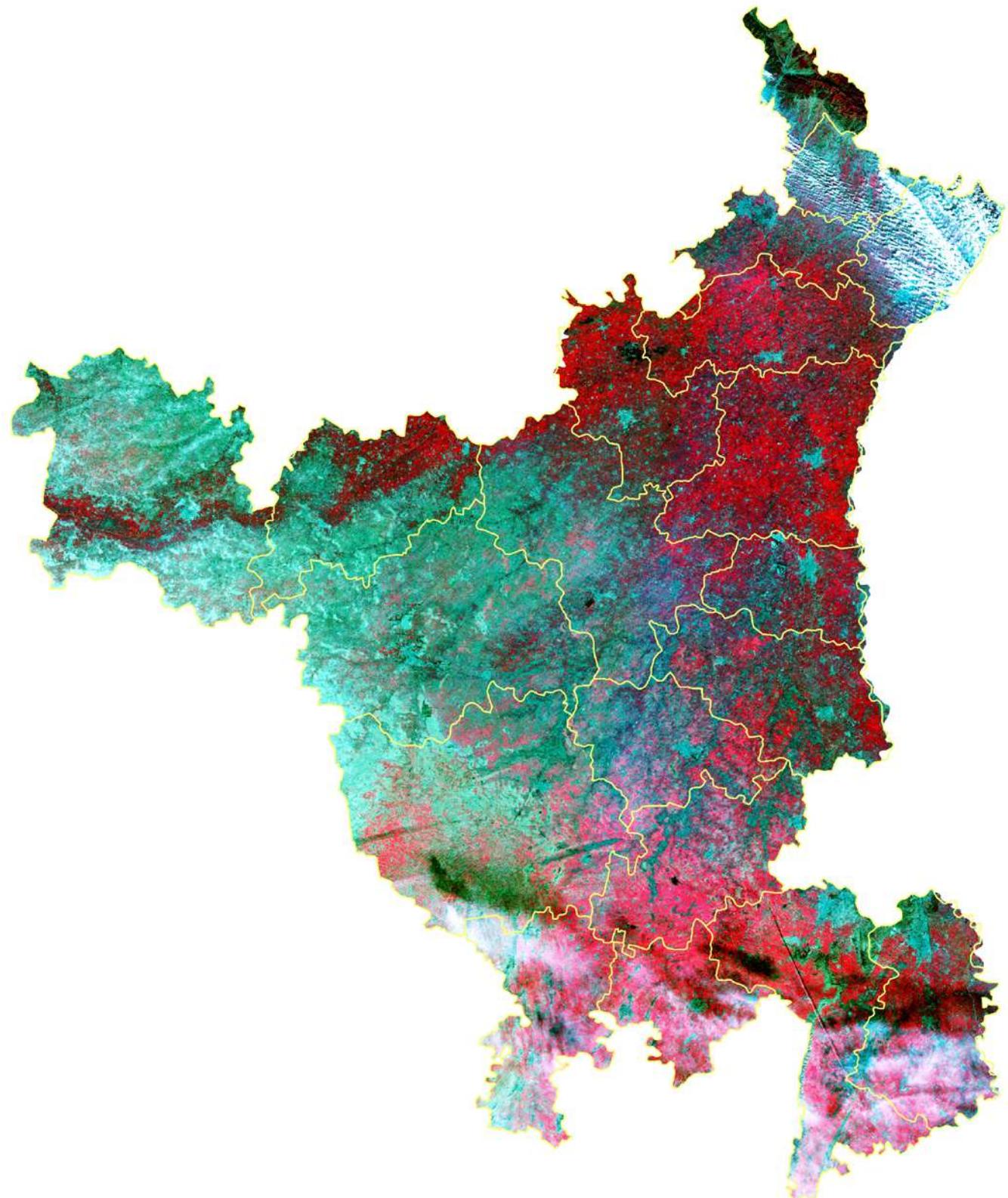
- Wetlands (<2.25ha)
- Settlements
- Drainage (line)
- Major Roads
- - - Railway
- Town/Settlements
- District Boundary
- State Boundary
- International Boundary

Location Map



Data Source :	IRS P6 LISS III data (Pre-monsoon and Post-monsoon Season 2006-07)
Prepared By :	Space Applications Centre (ISRO), Ahmedabad and Haryana Space Applications Centre, Hisar and M. G. Science Institute, Ahmedabad
Sponsored By :	Ministry of Environment and Forests Government of India

State : Haryana



IRS P6 AWiFS post monsoon data (2004)

7.1.1 Panchkula

Panchkula district is the northern most part of the Haryana State. It has been carved out from Ambala district in the year of 1995. It comprises of a total area of about 898 sq. km. It lies between north latitudes $30^{\circ}21'$ to $30^{\circ}56'$ and $76^{\circ}48'$ to $77^{\circ}10'$ east longitudes. The average rainfall of Panchkula district is about 1430 mm. about 80 percent of its annual rainfall is received in months of June to September. It also receives some rains in the winter months due to western disturbances. Despite heavy rainfall in this area, the water retention is very low. It is due to high surface runoff because of high slopes in the area. Temperature starts rising steadily from February onwards till the onset of monsoon. The hottest months in the year are May and June with mean daily maximum temperature is about 45° C. The coldest month of the year is January with mean daily minimum temperature of 3° C.

The Panchkula district comprises of four distinct physiographic units, which are roughly parallel to each other. The districts form a part of the Indo-Gangetic plain and the Himalayan ranges. These physiographic units are: Siwalik Hills, Kandi Belt, Intermountain Valley and Alluvial Plain. Siwalik Hills: The Siwalik hills form the north and eastern parts of the area. These hill ranges are roughly run in NNW-SSE direction, attain an altitude of 600 meters and slopes towards southwest with an average gradient of about 28 m/km. These hills are deeply eroded and furrowed to form bad land topography.

The geological milieu in the district represents the lithological formation belonging to the Indo-Gangetic plain and Extra-Peninsular regions. The district can be divided in two different geological units as Tertiary rocks of Lesser Himalayas & Siwalik and Quaternary deposits of Indo-Gangetic Plains.

Details of the wetland statistics of the district are given in Table 6.

Table 6: Area estimates of wetlands in Panchkula

Sr. No.	Wettcode	Wetland Category	Number of Wetlands	Total Wetland Area	% of wetland area	Open Water		Area in ha
						Post-monsoon Area	Pre-monsoon Area	
1100 Inland Wetlands - Natural								
1	1101	Lakes/Ponds	-	-	-	-	-	-
2	1102	Ox-bow lakes/ Cut-off meanders	-	-	-	-	-	-
3	1103	High altitude wetlands	-	-	-	-	-	-
4	1104	Riverine wetlands	-	-	-	-	-	-
5	1105	Waterlogged	5	37	1.17	37	37	
6	1106	River/Stream	15	3051	96.16	43	2680	
1200 Inland Wetlands - Man-made								
7	1201	Reservoirs/Barrages	-	-	-	-	-	-
8	1202	Tanks/Ponds	1	7	0.22	6	6	
9	1203	Waterlogged	-	-	-	-	-	-
10	1204	Salt pans	-	-	-	-	-	-
Sub-Total			21	3095	97.54	86	2723	
Wetlands (<2.25 ha), mainly Tanks			78	78	2.46	-	-	
Total			99	3173	100.00	86	2723	

Area under Aquatic Vegetation	-	-
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Area under turbidity levels		
Low	6	6
Moderate	42	2681
High	39	36

The total wetland area in the district is 3173 ha and river/streams contribute 96 per cent. Water spread area in post-monsoon season is 86 ha. Where as in pre-monsoon season the area increased to 2723 ha and it is due to melting of snow in the up streams of the snow fed rivers. In all there are only 21 wetlands having area more than 2.25 ha in the district and less than 2.25ha wetlands are 78. Qualitative turbidity ranges from moderate to high and open water devoid of aquatic vegetation in both the season. High turbidity is due to dispersion of silt and clay originated because of erosion.

State : Haryana

WETLAND MAP

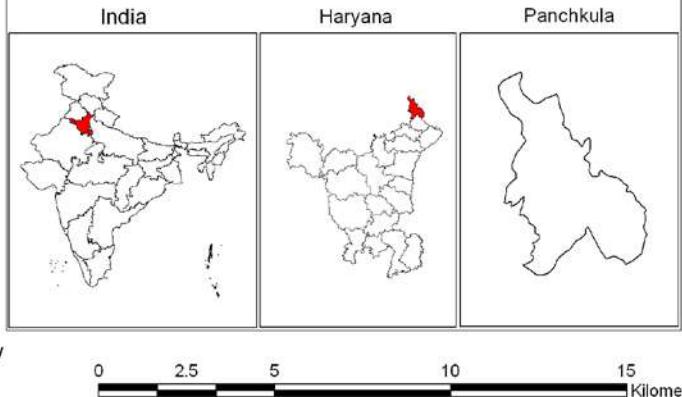
District : Panchkula



Symbol	Typecode	Level I	Level II	Level III
		Inland Wetlands		
			Natural	
■	1101			Lakes/Ponds
■	1102			Ox-bow lakes/ Cut-off meanders
■	1103			High altitude wetlands
■	1104			Reverine wetlands
■	1105			Waterlogged
■	1106			River/Stream
			Man-made	
■	1201			Reservoirs/Barrages
■	1202			Tanks/Ponds
■	1203			Waterlogged
■	1204			Salt pans
		Coastal Wetlands		
			Natural	
■	2101			Lagoons
■	2102			Creeks
■	2103			Sand/Beach
■	2104			Intertidal mud flats
■	2105			Salt marsh
■	2106			Mangroves
■	2107			Coral reefs
			Man-made	
■	2201			Salt pans
■	2202			Aquaculture ponds

Legend

- Wetlands (<2.25ha)
- Settlements
- Drainage (line)
- Major Roads
- - Railway
- Town/Settlements
- District Boundary
- State Boundary
- International Boundary

Location Map**Data Source :**

IRS P6 LISS III data (Pre-monsoon and Post-monsoon Season 2006-07)

Prepared By :

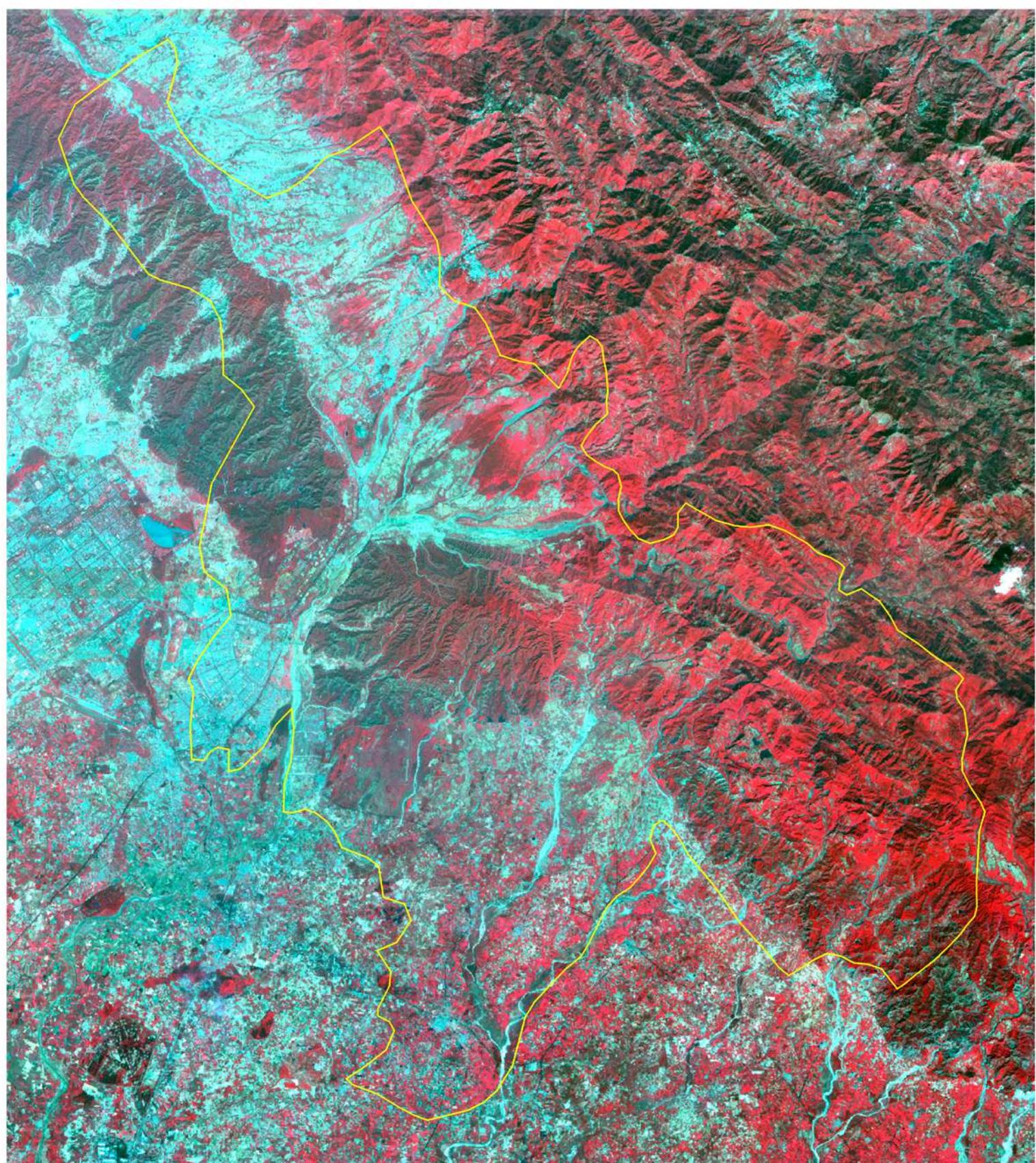
Space Applications Centre (ISRO), Ahmedabad
and
Haryana Space Applications Centre, Hisar
and
M. G. Science Institute, Ahmedabad

Sponsored By :

Ministry of Environment and Forests
Government of India

State : Haryana

District : Panchkula



IRS P6 LISS-III post monsoon data (2006)

7.1.2 Ambala

The Ambala district is located between $30^{\circ}07'$ N to $30^{\circ}34'$ N latitude and $76^{\circ}20'$ E to $77^{\circ}10'$ E longitude. The total area of the district is 1574 sq. km. A very hot and dry summer, southwest monsoon season and a bracing cold season characterize the climate of district. The average annual rainfall ranges between 1175 to 1345 mm (based on averages of 1995-99, 1996-2000 & 1997-01). About 71 per cent of annual rainfall is received during the short south-western monsoon period. There is a rapid increase in temperature after February. The mean daily maximum temperature is reached up to 43.7 in May, which is the hottest months and lowest reached up to 2.2°C in January, which is the coldest month. Foothill Rolling Plain is a long belt of undulating, fairly sloping plain with elevation 300-400 meter, adjoining the Shiwalik range. The district is mainly drained by non-perennial stream. From the east to west the drainage system of the district comprises of Chautang, Rakshi, Saraswati, Markanda, and the tributaries and Dangri (Tangri) and its tributaries. The northern part of the district constitutes territory rocks including lime stone, sand stone, shale and boulder conglomerate and these from low lying hill ranges known as the Shiwalik foot hills. The southern part of district is occupies by the Indo-Gangetic alluvial comprising clay, silt and sand.

Details of the wetland statistics of the district are given in Table 7.

Table 7: Area estimates of wetlands in Ambala

Sr. No.	Wettcode	Wetland Category	Number of Wetlands	Total Wetland Area	% of wetland area	Open Water		Area in ha
						Post-monsoon Area	Pre-monsoon Area	
1100 Inland Wetlands - Natural								
1	1101	Lakes/Ponds	-	-	-	-	-	-
2	1102	Ox-bow lakes/ Cut-off meanders	-	-	-	-	-	-
3	1103	High altitude wetlands	-	-	-	-	-	-
4	1104	Riverine wetlands	-	-	-	-	-	-
5	1105	Waterlogged	3	23	0.76	23	23	
6	1106	River/Stream	9	2583	85.08	0	934	
1200 Inland Wetlands - Man-made								
7	1201	Reservoirs/Barrages	-	-	-	-	-	-
8	1202	Tanks/Ponds	17	85	2.80	79	78	
9	1203	Waterlogged	3	27	0.89	26	15	
10	1204	Salt pans	-	-	-	-	-	-
		Sub-Total	32	2718	89.53	128	1050	
		Wetlands (<2.25 ha), mainly Tanks	318	318	10.47	-	-	
		Total	350	3036	100.00	128	1050	

Area under Aquatic Vegetation	4	11
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Area under turbidity levels		
Low	78	78
Moderate	0	935

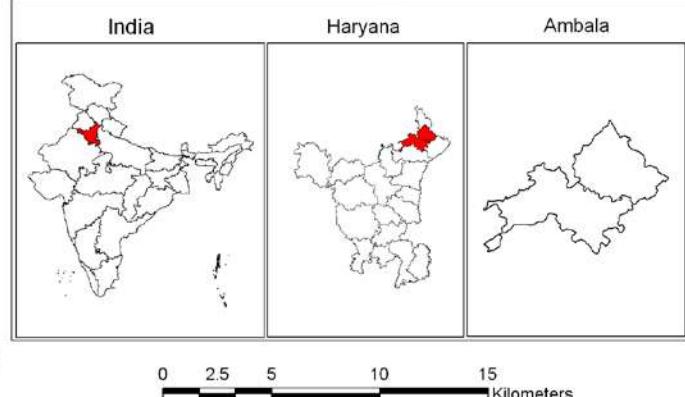
The total wetland area in the district is 3036 ha. and riverstreams contribute 95 per cent. Water spread area in post-monsoon season is almost negligible. Where as in pre-monsoon season the area increased to 935 ha. due to melting of snow in upper stretches rivers. In all there are only 32 wetlands having area more than 2.25 ha in the district where as less than 2.25 ha wetlands are 318. Qualitative turbidity ranges from low to high. High turbidity is observed in rivers/ streams during pre-monsoon season. Out of 32 wetlands 4 wetlands infested by aquatic vegetation whereas in pre-monsoon season 11 wetlands. High turbidity is due to dispersion of sediments in rivers.



Symbol	Typecode	Level I	Level II	Level III
		Inland Wetlands		
			Natural	
■	1101			Lakes/Ponds
■	1102			Ox-bow lakes/ Cut-off meanders
■	1103			High altitude wetlands
■	1104			Reverine wetlands
■	1105			Waterlogged
■	1106			River/Stream
			Man-made	
■	1201			Reservoirs/Barrages
■	1202			Tanks/Ponds
■	1203			Waterlogged
■	1204			Salt pans
		Coastal Wetlands		
			Natural	
■	2101			Lagoons
■	2102			Creeks
■	2103			Sand/Beach
■	2104			Intertidal mud flats
■	2105			Salt marsh
■	2106			Mangroves
■	2107			Coral reefs
			Man-made	
■	2201			Salt pans
■	2202			Aquaculture ponds

Legend

- Wetlands (<2.25ha)
- Settlements
- Drainage (line)
- Major Roads
- Railway
- Town/Settlements
- District Boundary
- State Boundary
- International Boundary

Location Map

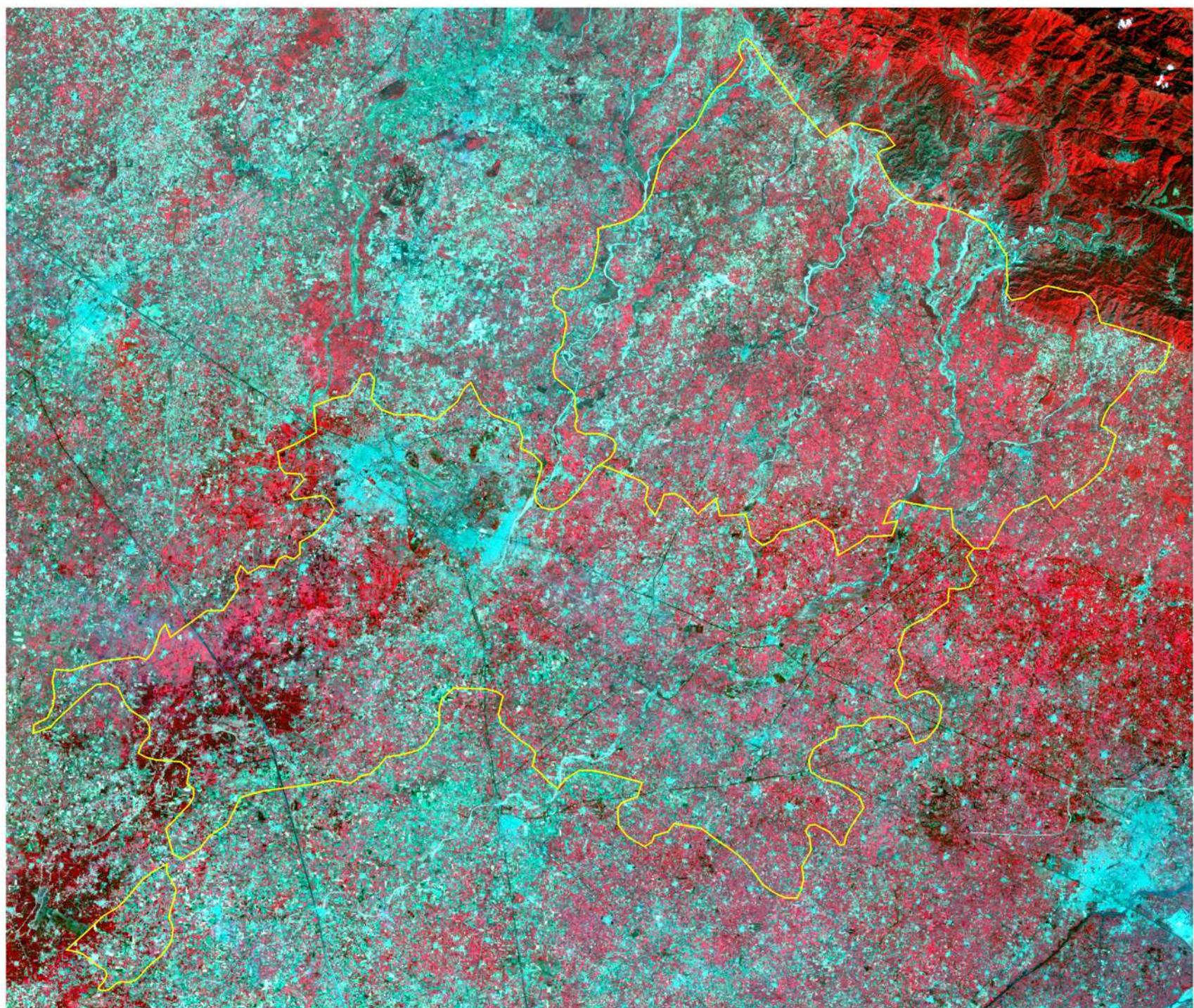
Data Source : IRS P6 LISS III data (Pre-monsoon and Post-monsoon Season 2006-07)

Prepared By : Space Applications Centre (ISRO), Ahmedabad and Haryana Space Applications Centre, Hisar and M. G. Science Institute, Ahmedabad

Sponsored By : Ministry of Environment and Forests Government of India

State : Haryana

District : Ambala



IRS P6 LISS-III post monsoon data (2006)

7.1.3 Yamunanagar

The district lies between east longitude $77^{\circ}13'$ to $77^{\circ}36'$ and northern latitude $29^{\circ}50'$ to $30^{\circ}3'$. The area of the district is 1,768 sq. kms. The climate of the district is sub-tropical and characterized by a very hot and dry summer, southwest monsoon season and a bracing cold season. The average annual rainfall in the district is 1116 mm. About 81 per cent of the annual normal rainfall in the district is received during June to September whereas about 11 percent is received in the winter month of December to February. May and June are generally the hottest months in the year with the mean daily maximum temperature at about 41°C and the mean daily minimum at about 25°C to 27°C .

On the basis of similarities in local relief, slope, texture, surface material and arrangement of landform features, the district can be divided into three distinct physiographic units viz. shiwalik hill tracts, foothill rolling plain and Yamuna upland plain.

The main rivers/ streams of the district are Yamuna, Markanda, Bata Nala, Giri and Asan most of which are non-perennial streams. The Yamuna is a perennial river, which borders the district on its southeast. The soils in the district are mainly silty loam (Khadar), loam (Bhangar and Nardak), Piedmont (Ghar and Kandi) silty clay (Naili and Chhachhra-Dakar), and light loam (Seoti).

Table 8: Area estimates of wetlands in Yamunanagar

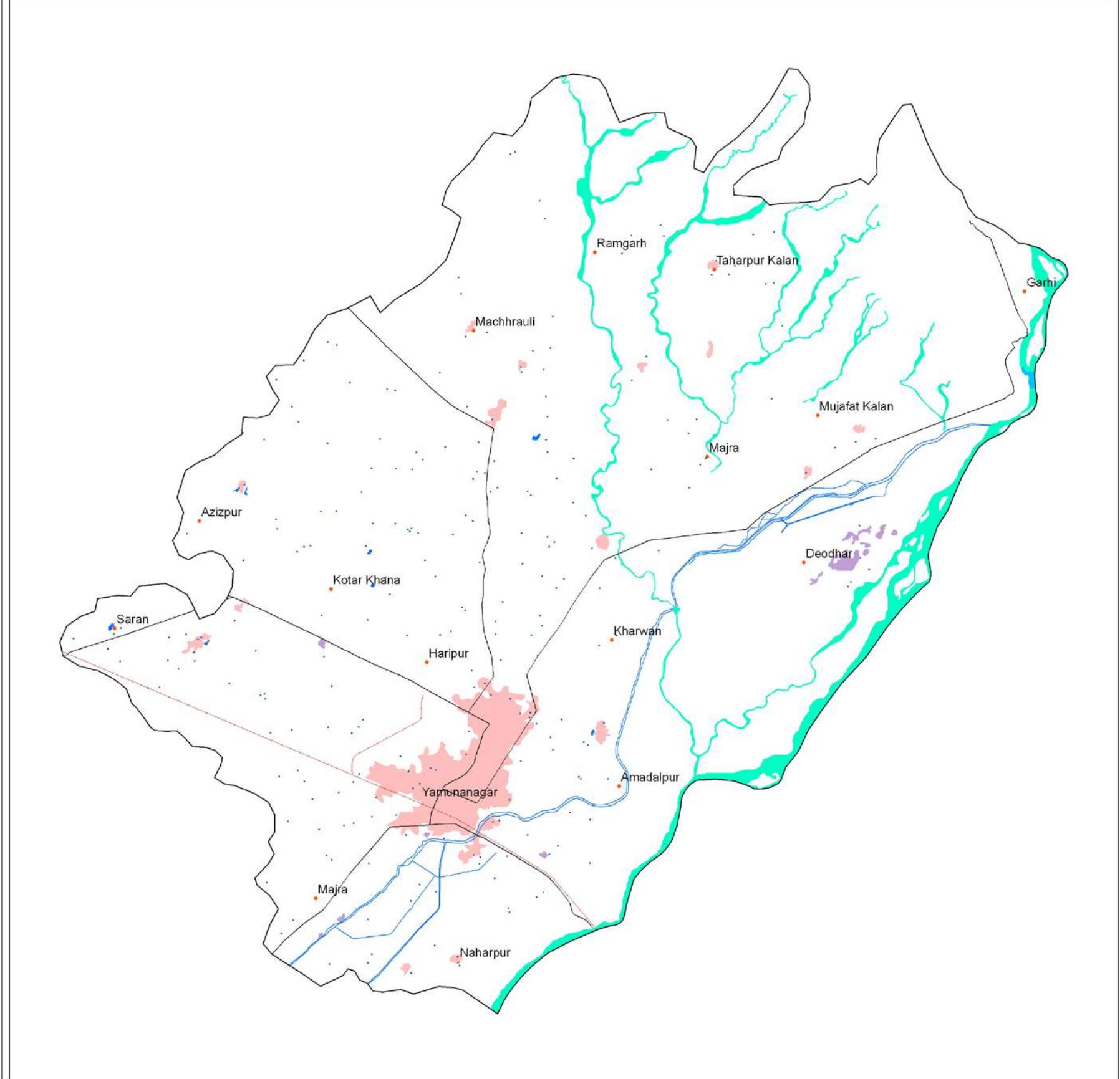
Sr. No.	Wettcode	Wetland Category	Number of Wetlands	Total Wetland Area	% of wetland area	Area in ha	
						Post-monsoon Area	Pre-monsoon Area
	1100	Inland Wetlands - Natural					
1	1101	Lakes/Ponds	-	-	-	-	-
2	1102	Ox-bow lakes/ Cut-off meanders	-	-	-	-	-
3	1103	High altitude wetlands	-	-	-	-	-
4	1104	Riverine wetlands	-	-	-	-	-
5	1105	Waterlogged	-	-	-	-	-
6	1106	River/Stream	5	4335	88.60	391	1963
	1200	Inland Wetlands - Man-made					
7	1201	Reservoirs/Barrages	1	37	0.76	34	19
8	1202	Tanks/Ponds	8	34	0.69	24	26
9	1203	Waterlogged	12	240	4.90	240	69
10	1204	Salt pans	-	-	-	-	-
		Sub-Total	26	4646	94.95	689	2077
		Wetlands (<2.25 ha), mainly Tanks	247	247	5.05	-	-
		Total	273	4893	100.00	689	2077

Area under Aquatic Vegetation	9	8
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Area under turbidity levels		
Low	57	45
Moderate	392	1965
High	240	67

The total wetland area in the district is 4893 ha and river/streams contribute 87 per cent. Water spread area in post-monsoon season is less 689 ha and in pre-monsoon season 2077 ha. In all there are only 26 wetlands having area more than 2.25 ha in the district where as less than 2.25 ha wetlands are 247. Man made waterlogged area is second dominating wetland category which accounts for an area of 240 ha. This wetland type is common in the district due to sugar cane cultivation and well-connected canals and distributaries. Qualitative turbidity ranges from low to high. Most of the wetlands showed moderate turbidity in post monsoon (392 ha) and 1965 ha in pre-monsoon season.

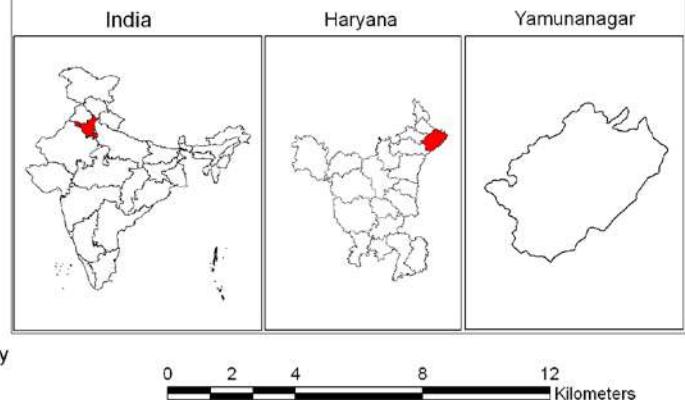
Out of 26 wetlands 9 wetlands are infested by aquatic vegetation during post-monsoon season and 8 in pre-monsoon season.



Symbol	Typecode	Level I	Level II	Level III
		Inland Wetlands		
			Natural	
■	1101			Lakes/Ponds
■	1102			Ox-bow lakes/ Cut-off meanders
■	1103			High altitude wetlands
■	1104			Reverine wetlands
■	1105			Waterlogged
■	1106			River/Stream
			Man-made	
■	1201			Reservoirs/Barrages
■	1202			Tanks/Ponds
■	1203			Waterlogged
■	1204			Salt pans
		Coastal Wetlands		
			Natural	
■	2101			Lagoons
■	2102			Creeks
■	2103			Sand/Beach
■	2104			Intertidal mud flats
■	2105			Salt marsh
■	2106			Mangroves
■	2107			Coral reefs
			Man-made	
■	2201			Salt pans
■	2202			Aquaculture ponds

Legend

- Wetlands (<2.25ha)
- Settlements
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Location Map

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