Report No.-09

JSA-CTR

Scientific Action Plan for Jind

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Introduction

The district lies in the North of Haryana between 29 °03′ 00″ to 29° 51′ 00″ North latitude and 75° 53′ 00″ to 76° 45′ 30″ East longitude falling in the Survey of India toposheet No. 53C and 44O. It is bounded by Patiala in the North and Sangrur district of Punjab in the northeast. It is surrounded by district Kaithal and Karnal of Haryana in east and west respectively. In southwest, it has a common boundary with district Hisar, whereas in south and southeast it shares its boundary with Rohtak and Sonipat respectively. Jind district encompasses a geographical area of 2702 Sq.km.

As per 2011 census, the total population of the district is 1332042. During 1991 census, the district registered a growth of 21.36% in a last decade. The rural and urban population is 9,48,250 and 2,41,577 with an average density of 440-person/sq. km. Out of total population 6,42,282 are males and 5,47,545 are females. The male and female ratio of the district as a whole was 1000:852. In Jind district, 79% of the population is settled in 307 villages and the rest 21% of population is concentrated in five towns. There is no scheduled tribe population in the district, as no part of the district is under tribal area. The population of schedule caste is 2,35,765 out of which 1,98,790 belong to rural and 36,975 to urban area. The percentage of schedule caste population of the district is
19.81%. The literacy rate in the district is 52.33% out of which the male literacy is 33.44% while female literacy is 18.88%

The area of Jind district is irrigated by two canal systems i.e. The Western Yamuna canal and the Bhakra canal. The Narwana and Barwala link canals of Bhakra canal system interlink these two systems. Western Yamuna Canal takes off from the Yamuna at Tajewala head works (Ambala district). The Sirsa branch bifurcates from the main Western Yamuna canal at Indri (Karnal district) and joint by Narwana branch of Bhakra canal near Budhera. About 49.0 km further down the Hansi Branch takes off from main branch of Western Yamuna canal at village Munak. Sirsa Branch irrigates area in the Northern part of Jind district by Narwana branch of the Bhakra canal and its distributaries i.e., Habri sub branch, Jakhali, Rajaund, Sudkain Dhanauri etc. The area of the district irrigated by the Sirsa branch is approx. 143744ha. Hansi branch enters in the district near Anta village in Safidon Tehsil with the augmentation of water supply fromBhakra canal. It irrigates the southern part of the Jind district through Buthra Branch and Sunder sub branch. The area irrigated by Hansi branch system is approx. 63326ha. Narwana Branch link canal irrigates some area of Jind district in its tail reaches. The district is also irrigated through Khanauri and Haripur minors. The area irrigated by these distributaries is approx. 5000 ha. (Source irrigation Dept. Canal).

1.1 History

Jind is said to have been founded by the Pandavas of the Mahabharata epic, who built a temple around which the town of Jaintapuri (Jind) grew. It was formerly one of the princely Phulkian states of the

Punjab that had been established in the 18th century by Sutlej Sikh chieftains.

1.2 Location

The district lies in the North of Haryana between 29° 03$^{/}$ 00$^{//}$ to 29^{0} 51$^{/}$ 00$^{//}$ North latitude and 75° 53$^{/}$ 00$^{//}$ to 76° 45$^{/}$ 30$^{//}$ East longitude falling in the Survey of India toposheet No. 53C and 44O. It is bounded by Patiala in the North and Sangrur district of Punjab in the northeast. It is surrounded by district Kaithal and Karnal of Haryana in east and west respectively. In southwest, it has a common boundary with district Hisar, whereas in south and southeast it shares its boundary with Rohtak and Sonipat respectively. The location map of Jind district is shown in **Figure 1**.

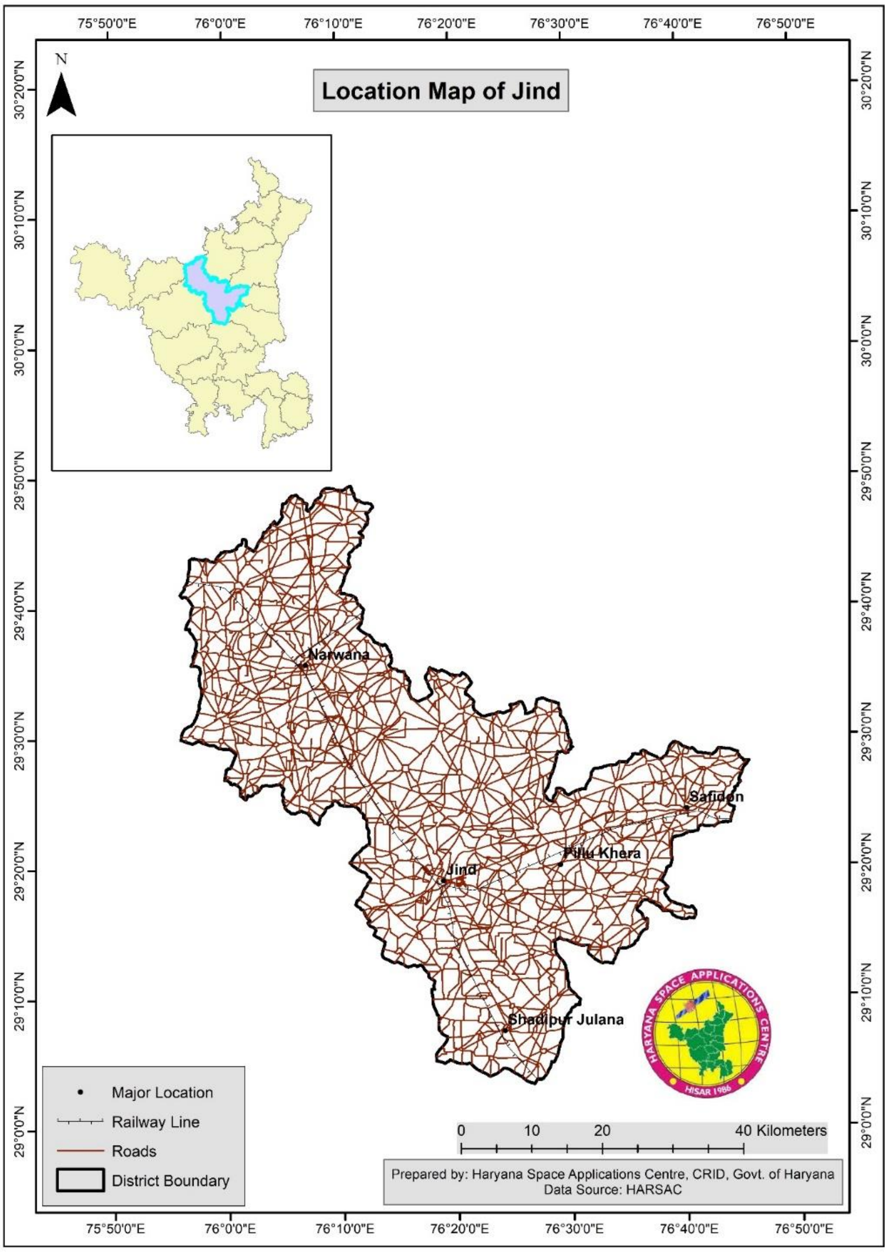


Figure 1 Location Map of Jind District

1.3 Administrative setup

For the administrative convenience, the Jind district, a segment of the Hisar division has been divided into four (04) tehsils i.e., Narwana, Jind, Safidon and Julana. In order to streamline the rural development, these tehsils have been further subdivided into eight blocks namely Narwana, Uchana, Alewa, Jind, Julana, Pilukhera, Ujhana and Safidon. Jind is one of the oldest districts in Haryana and it was formed on 1st of November 1966. The administrative set up is extremely organized and works efficiently. There are different department and the concerned authorities' looks after various functions of the department. Jind sub – division is classified into three groups. The divisions are Jind, Julana Tehsil & Sub-Tehsil Alewa. Jind is further classified into three towns and 307 villages. Out of the 307 villages, 303 villages are inhabited and 4 villages are uninhabited. The following table (**Table 1 & Figure 2**) shows the description of administrative set up of Jind district.

Table 1 Administrative Setup

Country	India
State	Haryana
Division	Hisar
Headquarters	Jind
Tehsil	Narwana, Uchana, Alewa, Jind, Julana, Pilukhera and Safidon
Total Population (2011)	167,592
Density	440/km^2 (1,100/sq. mi)
Demographics (Sex Ratio)	911
Literacy	75%
Vidhan Sabha constituencies	Jind City
Website	www.jind.nic.in
Location of Jind	Bounded by Patiala in the North and Sangrur district of Punjab in the northeast. It is surrounded by district Kaithal and Karnal of Haryana in east and west respectively
Coordinates	29.03 ˚N to 29.51 ˚N, 75.53 ˚E to 76.47 ˚E
Total Area	2,702 km^2 (1,043 sq. mi)

Elevation	227 m (745 ft.)
Sub Divisions (4)	Jind, Narwana, Safidon and Uchana
Tehsils	Narwana, Jind, Safidon and Julana
Blocks (8)	Narwana, Uchana, Alewa, Jind, Julana, Pilukhera, Ujhana and Safidon
Municipal Committee (1)	Jind
Population (Census 2011)	900,332

S. No.	**Tehsil**	**Villages**
1	Jind (70)	70
2	Safidon (44)	44
3	Julana (30)	30
4	Pilukhera (27)	27
5	Alewa (28)	28
6	Uchana (39)	47
7	Narwana (69)	60
Total	-	306

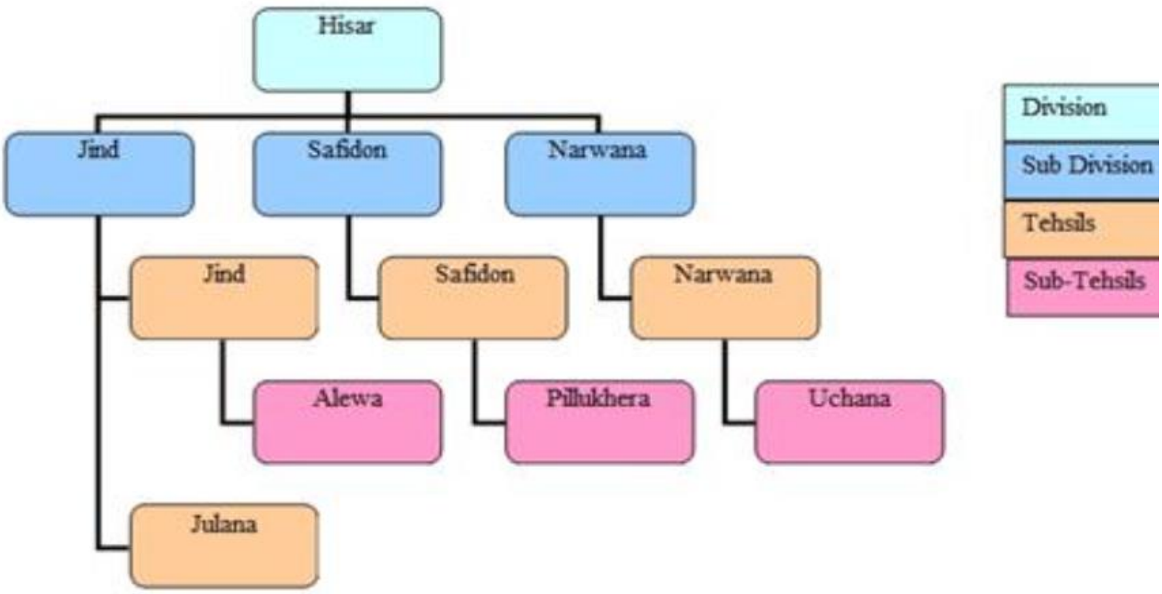


Figure 2 Administrative Setup

Here are the authorities of the Jind District:

Deputy Commissioner of Jind

The Deputy Commissioner undertakes the broad-spectrum of administration of Jind. The deputy commissioners report into the Divisional commissioner of Hisar, for all administrative purposes.

District Magistrate in Jind

The incumbent of the role of district magistrate has to ensure that law and order is maintained in the district. All affairs leading to criminal administration and policing has to be taken care of. Any displaced people who need rehabilitation, falls under the purview of the district magistrate. Suitable allotments have to be made to them according to the law of the land.

Tehsildar/ Naib Tehsildar in Jind

These officers constitute as assistant collector second grade. The Tehsildar and naib Tehsildar are the most important officers in the revenue department.

Police in Jind

The law and order of Jind is the responsibility of the Superintendent of police. He reports to the deputy commissioner. Two other deputy Superintendents of police are appointed and they work with the Superintendent of the police.

Statistics of Jind District

Sub-divisions – 4
Tehsils – 4
Sub-Tehsils – 3
Block Uchana – 7
Village Panchayat – 299
Vidhan Sabha Area - 5

1.4 Climate

Located at an elevation of none meters (0 feet) above sea level, Jind has a humid subtropical, dry winter climate (Classification: Cwa). The district's yearly temperature is 29.62ºC (85.32ºF) and it is 3.65% higher than India's averages. Jind typically receives about 12.37 millimeters (0.49 inches) of precipitation and has 20.54 rainy days (5.63% of the time) annually.

The climate of Jind district can be classified as tropical steppe, semi-arid and hot which is mainly dry monsoon season when with very hot summer and cold winter moist air of oceanic origin penetrate into except during the district.

There are four seasons in a year. The hot weather season starts from mid-March to last week of the June followed by the south west monsoon which lasts up to September. The transition period from September to October forms the post- monsoon season. The winter season starts late in November and remains up to first week of March.

1.4.1 Temperature

The temperatures are highest on average in June, at around 33.4 °C | 92.1 °F. The lowest average temperatures in the year occur in January, when it is around 13.0 °C which is shown in **Figure 3 & 5**.

1.4.2 Rainfall

The normal annual rainfall of the district is 515 mm, which is unevenly distributed over the area 26 days. The south west monsoon, sets in from last week of June and withdraws in end of September, contributed about 84% of annual rainfall. July and August are the wettest months. Rest 16% rainfall is received during non-monsoon period in the wake of western disturbances and thunder storms. Generally, rainfall in the district increases from southwest to northeast, which is shown in **Figure 4**.

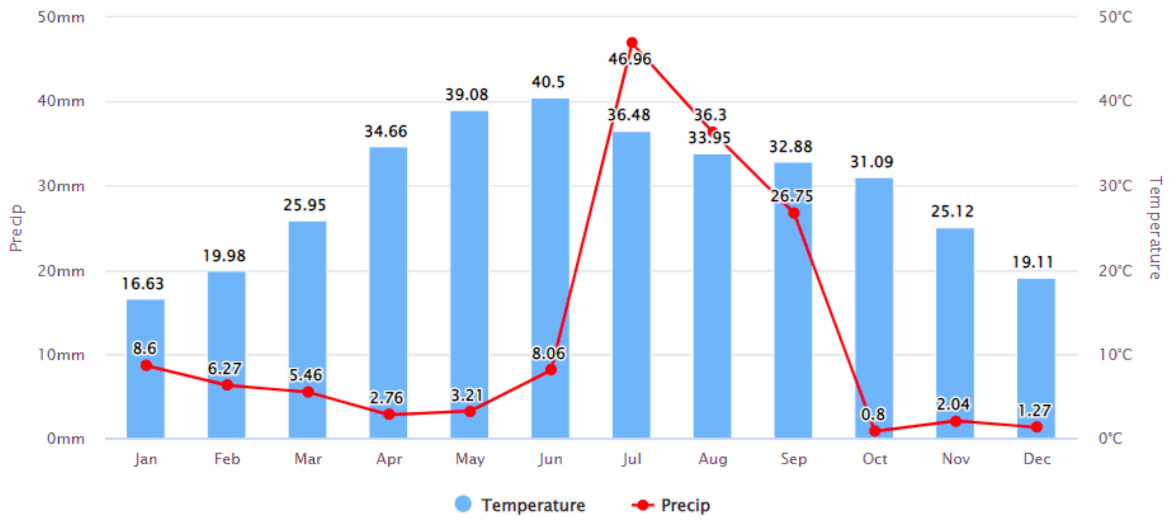


Figure 3 The mean monthly temperature and precipitation of Jind in recent years.

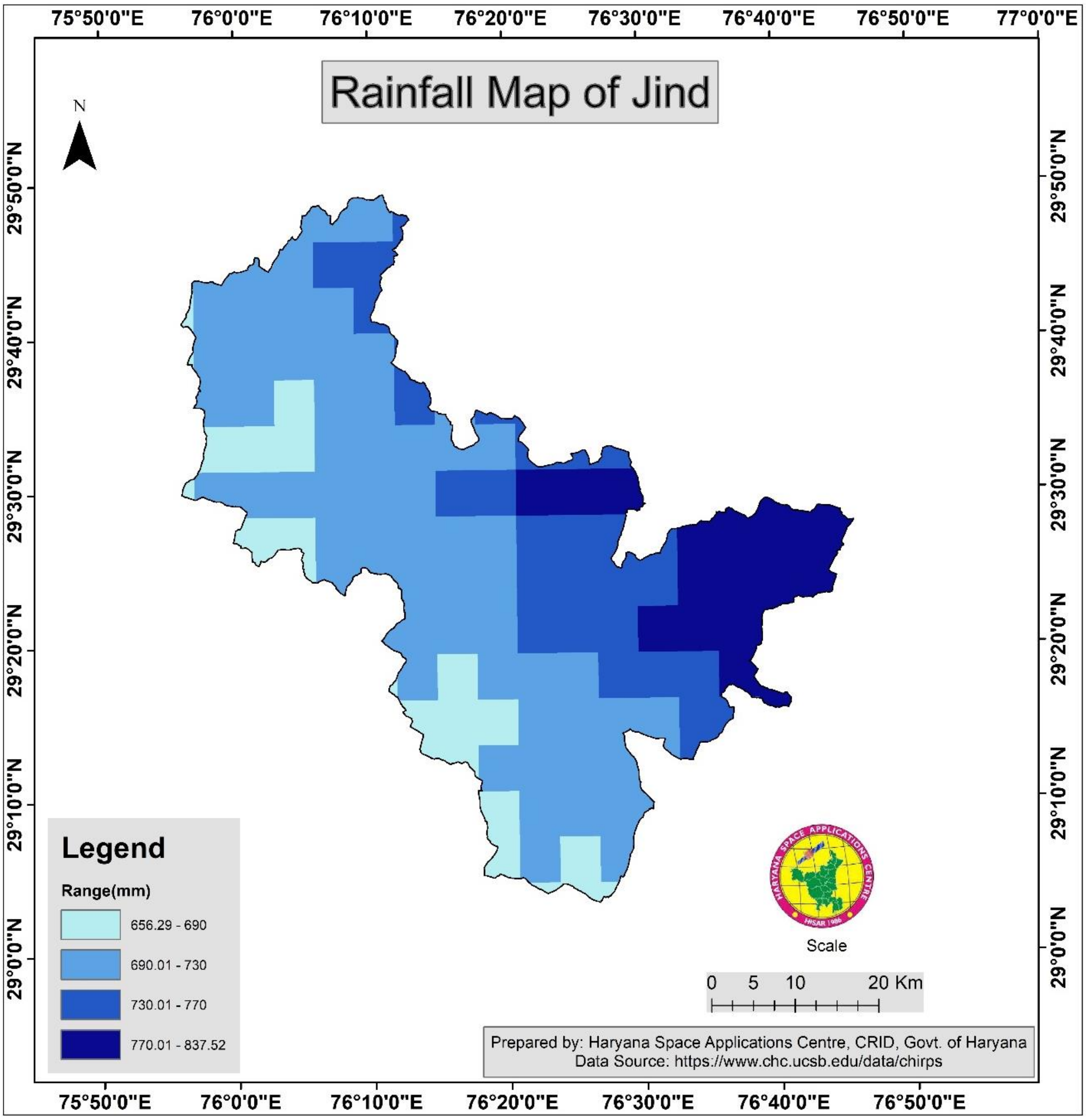


Figure 4 Rainfall Map of Jind District

Temperature

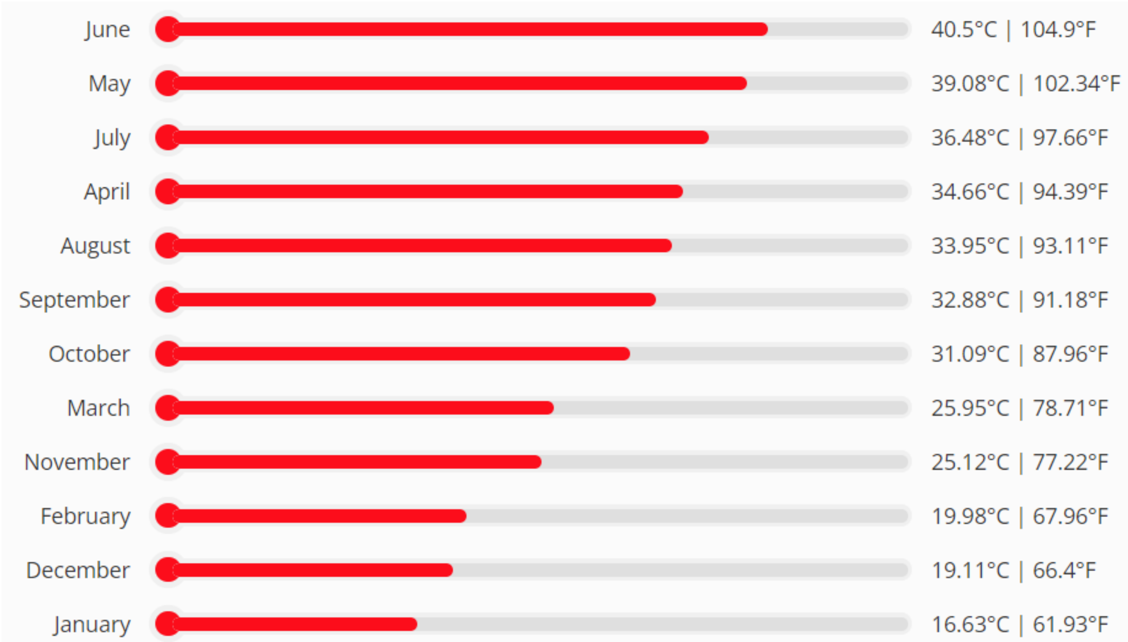


Figure 5 Jind Temperature by Month

1.5 Elevation and Topography

Jind is located at29.32°N 76.32°E. It has an average elevation of 227 meters (744 feet) **(Figure 6)**. The Sonipat district is located in the east; the southern districts are Rohtak and Bhiwani; Hisar is located in the west, and the Kaithal district is located in the north. Physiographically, it constitutes a part of the Punjab -Haryana plain, which is largely flat, featureless and monotonous alluvial upland plain and is formed of Pleistocene and sub recent alluvial deposits of the Indo-Gangetic system. It is dotted only sporadically with sand dunes and depression, yielding a local relief of not more than 6m. The district does not offer much physiographic diversity. There is no perennial river in the district. Only a small river Chautang nadi enters the district near the village Mundh and debouches near village Bosini into Karnal district after covering about a distance of ten kilometers in Jind district.

The district falls under the Agro Ecological Sub Region of Northern Plain &Central Highlands, and Agro-Climatic Region of Trans Gangetic Plain. The land is very plain with slope from North East to South and South Western direction. The DEM, slope and contour map of Rewari district is shown in **Figure 6, 7** and **8** respectively.

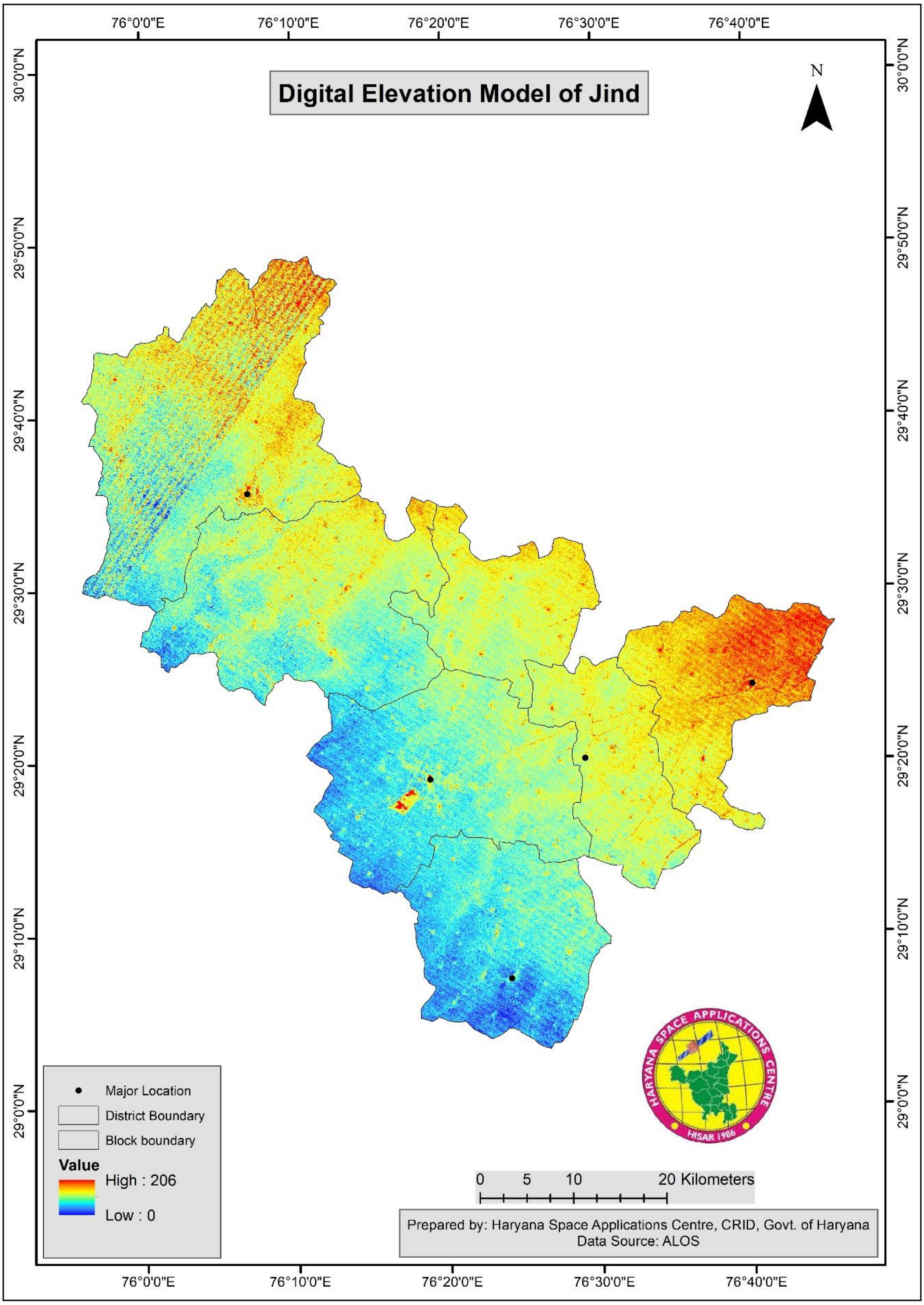


Figure 6 Digital Elevation Model of Jind District

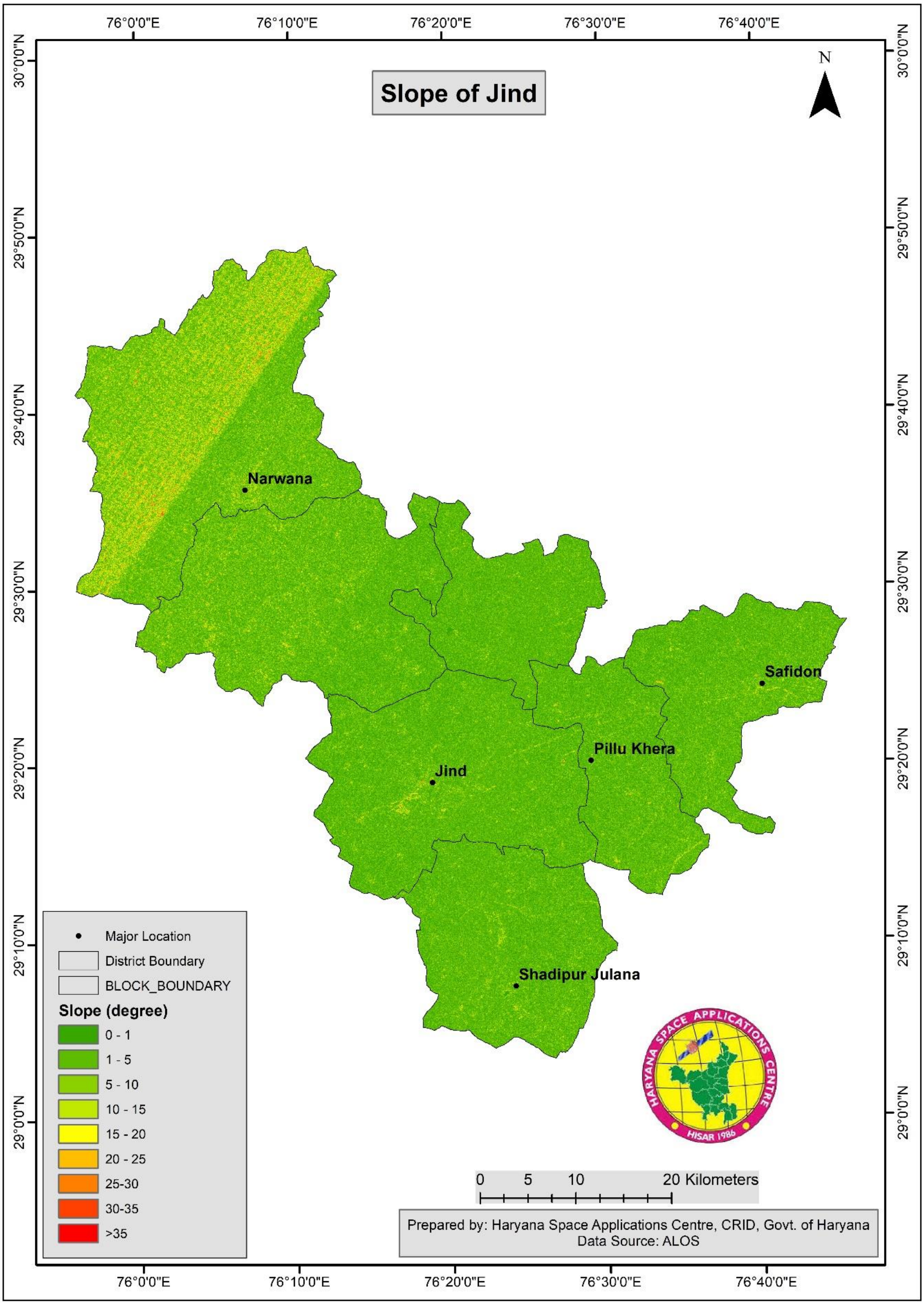


Figure 7 Slope Map of Jind District

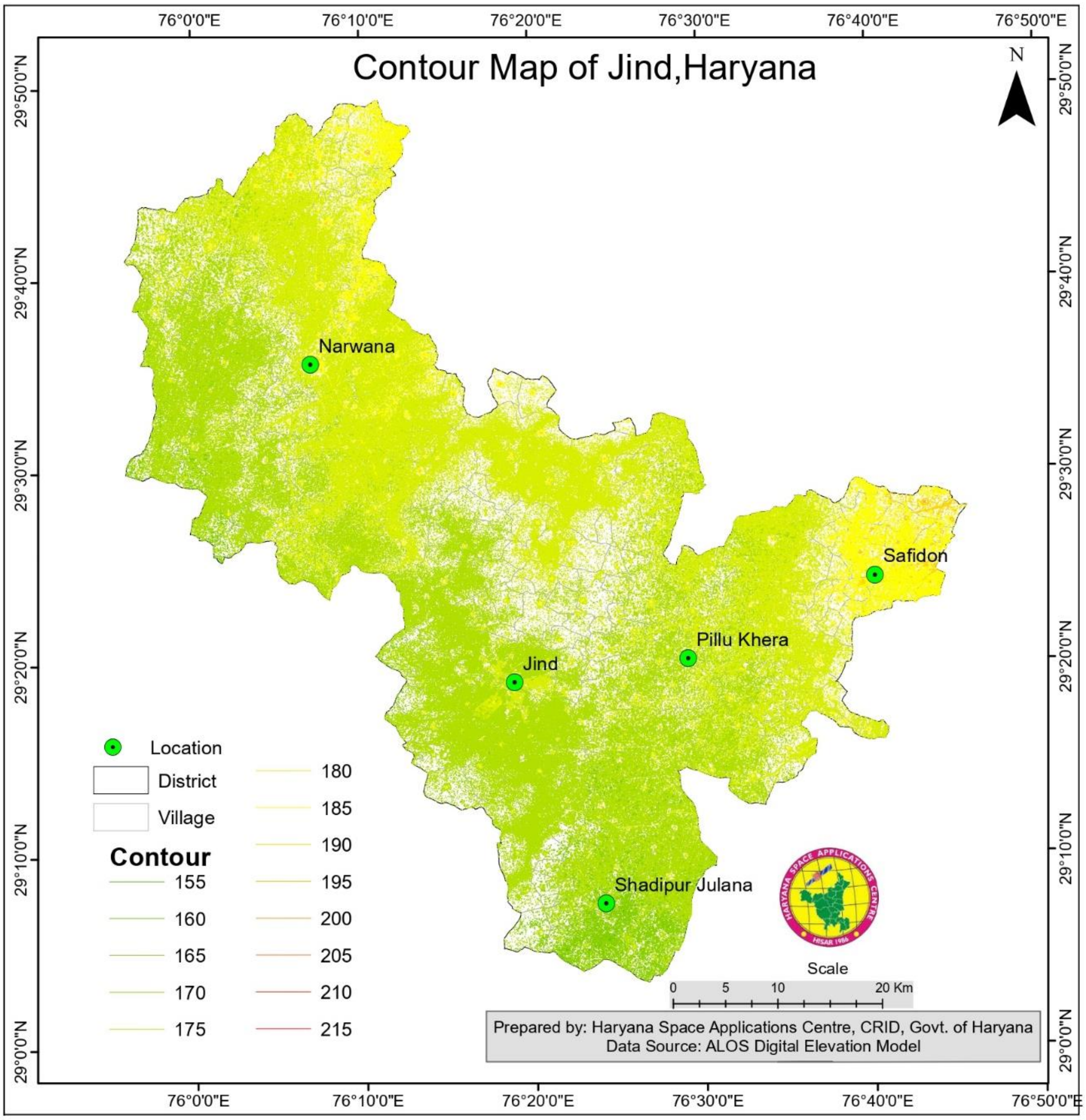


Figure 8 Contour Map of Jind District

1.5.1 Geology and Lithology

Geology is the study of the Earth, the materials of which it is made, the structure of those materials, and the processes acting upon them. An important part of geology is the study of how Earth's materials, structures, processes and organisms have changed over time.

The lithology of a rock unit is a description of its physical characteristics visible at outcrop, in hand or core samples, or with low magnification microscopy. Physical characteristics include colour, texture, grain size, and composition. Lithology may refer to either a detailed description of these characteristics, or a summary of the gross physical character of a rock. Examples of lithologies in the second sense include sandstone, slate, basalt, or limestone. (Lithological Map of Jind District is shown in Figure 9).

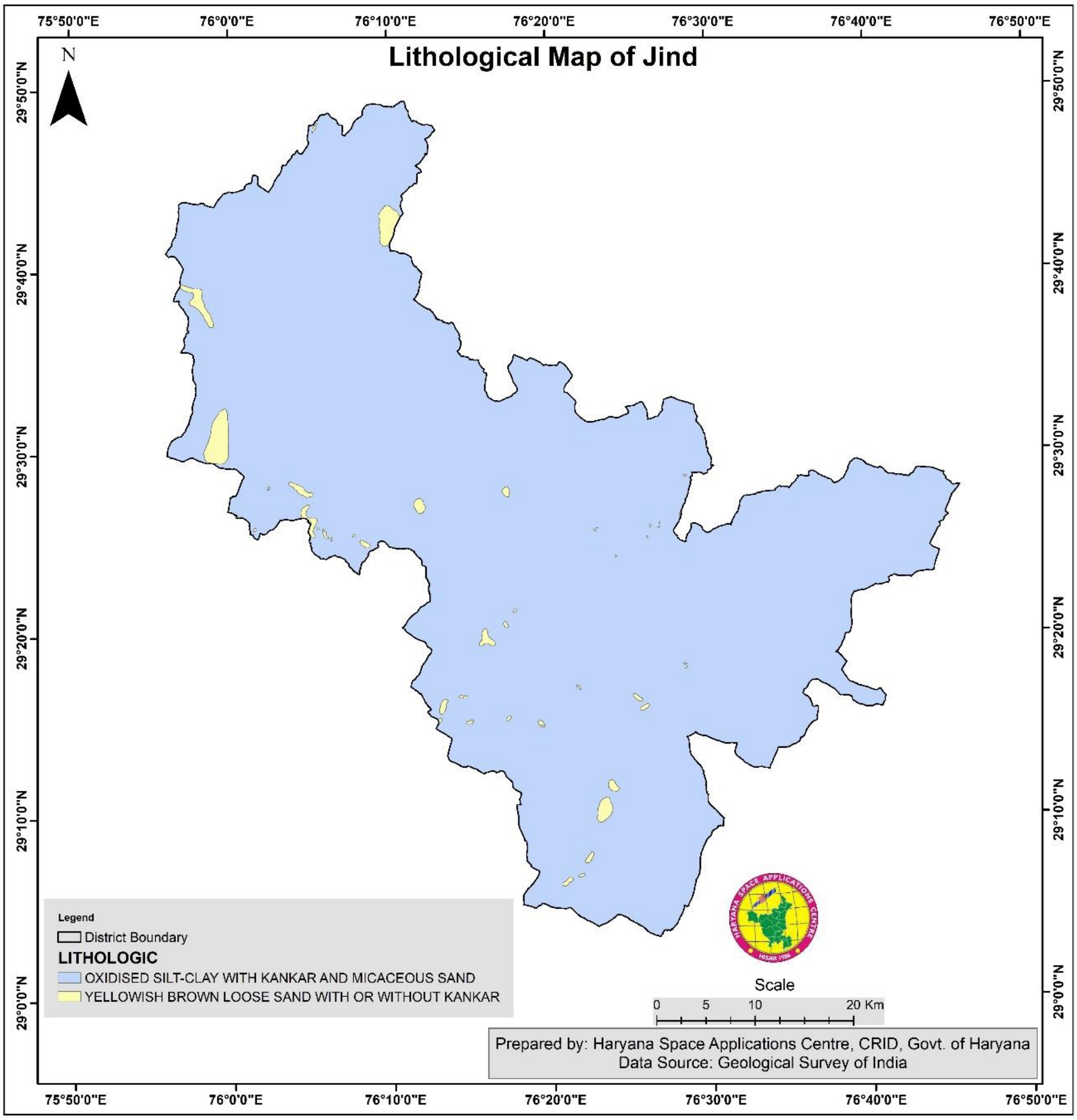


Figure.9 Lithological Map of Jind District

1.5.2 Soil Profile

The soils of the Jind district are sandy loam to loam in texture. According to physical characteristics, these soils may be divided into Sandy, Kallar or Rehi and Sierozem soil. Sandy soils locally called retail dharti are found in parts of all the blocks of the district. Bajra, Jowar and gram crops are generally grown in these soils. Kallar or Rehi soils are found in Safidon block of district. This type of soil is formed due to alkaline reaction. The reclamation of Kallar soils calls for the lowering down of excessive salts by flooding or by gypsum treatment. Sierozem soil, these soils are light yellowish brown to pale brown in colour. Soils are calcareous and normally have a kankar layer at a depth of 0.75m to 1.25m. Almost all the soils are deficient in nitrogen, phosphorous and potash Salinity and alkalinity are the serious problems particularly in the irrigated area, wind erosion is also a common feature in this area. Gram, wheat, Bajra, Jowar, cotton and mustard are the main crops of the area.

The land of district Jind is plain and fertile. Soils are medium to heavy in texture and pH varies from 7.5 to 9.1. The soils of the Jind district are sandy loam to loam in texture. The soil health of the district is of medium fertility. As per the soil health indices 92% soil is low and 8% is medium in per cent organic carbon. Similar trend is for available phosphorus (54% low and 45% medium in available phosphorous). The potassium status of soil is better than organic carbon and phosphorus. Almost all the soils are deficient in nitrogen, phosphorous and potash. Salinity and alkalinity are the serious problems particularly in the irrigated area. Besides, soil erosion due to winds is also a major problem (**Figure 10 & Table 2**).

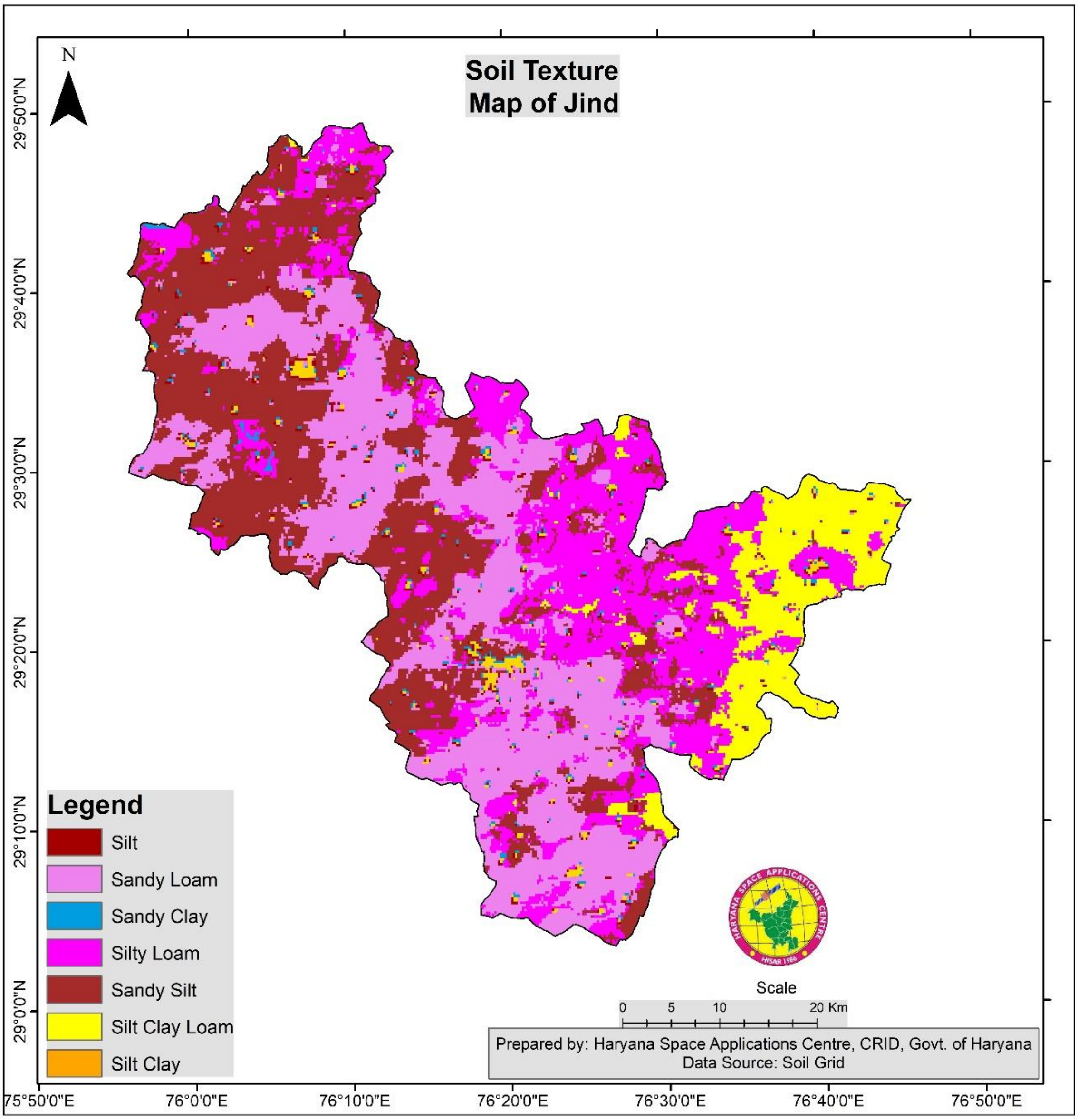


Figure 10 Soil texture map of Jind District

Table 2 Soil Classification

Sub District	Soil Type	Area Ha	Land Slope			
			0-3% (ha)	3-8% Ha)	8-25% (ha)	<25% (ha)
Jind	Coarse Loamy	96150	95150	1000	0	0
Safidon	Fine Loamy	47246	47246	0	0	0
Narwana	Coarse Loamy	103511	103511	0	0	0
Total		246907	245907	1000	0	0

1.6 Landuse

As per the information provided by the Agriculture Department, total geographical area of the district is 2,74,024 ha. Net area under cultivation of different crops is 2,38,826 ha. The share of net area sown to total geographical area is 87.15 per cent. The cropping intensity of the district is 198% shown in **Table 3 & Figure 11**.

Table 3 Land Use Pattern

Name of Block	No. of Villages	Total G.A (ha)	Area under Agriculture			Area under Forest (ha)	Area under Wasteland (ha)	Area under Other use (ha)
			Gross cropped area	Net Sown area	Cropping Intensity			
Jind	67	47621	78533	39584	198	900	Nil	29029
Alewa	22	23447	42336	21290	199			
Julana	39	34987	59786	30470	196			
Narwana	61	64596	113621	57051	199			
Uchana	47	50395	88730	44688	199			
Safidon	44	30269	51570	26176	197			
P. Khera	27	22709	38875	19567	199			
Total	307	274024	473451	238826	198	900	Nil	29029

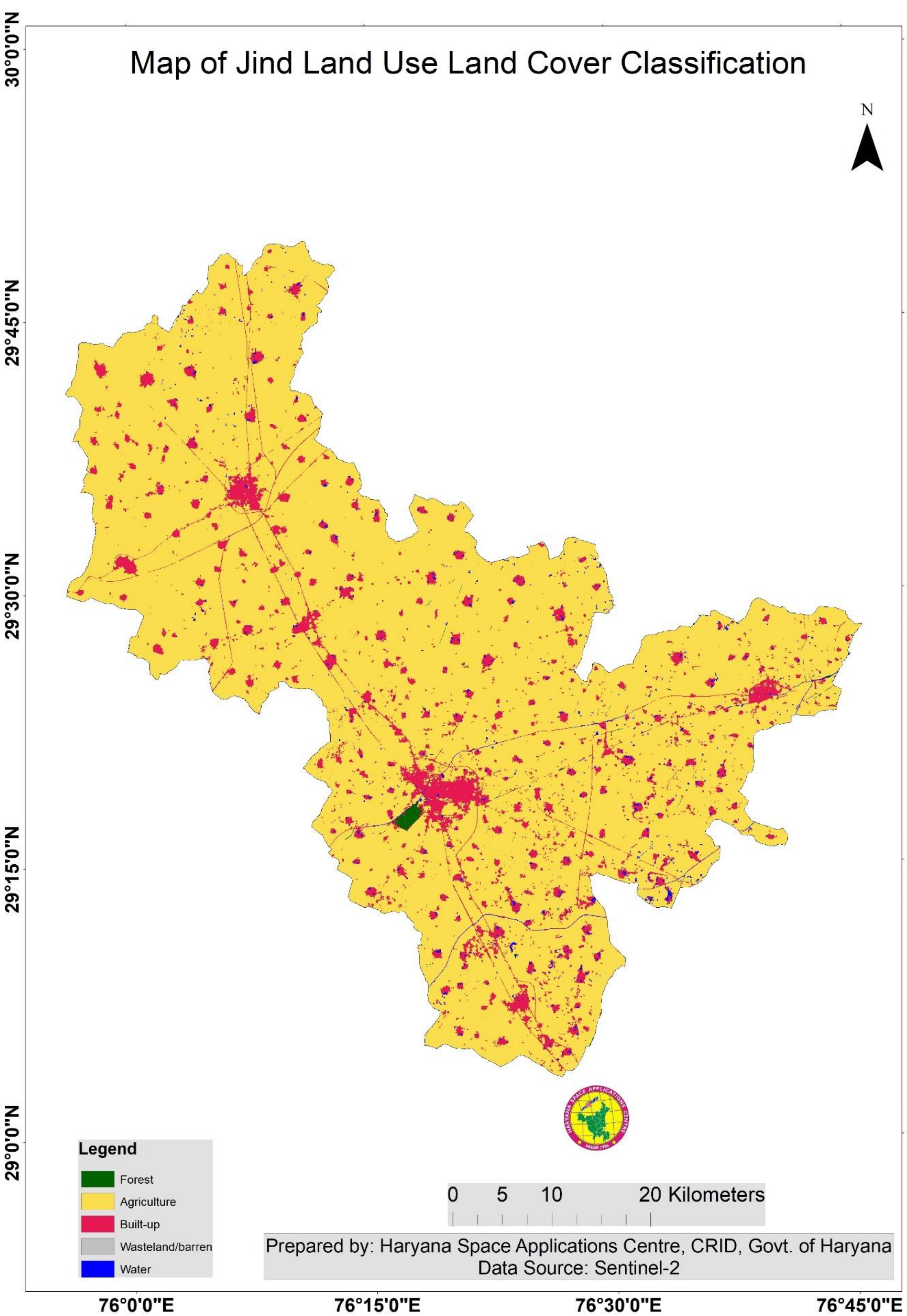


Figure 11 Land use and Land cover of Jind District

The district covers total of 307 villages in seven blocks. The share of geographical area of each block in the district is depicted in the following **Figure 12**.

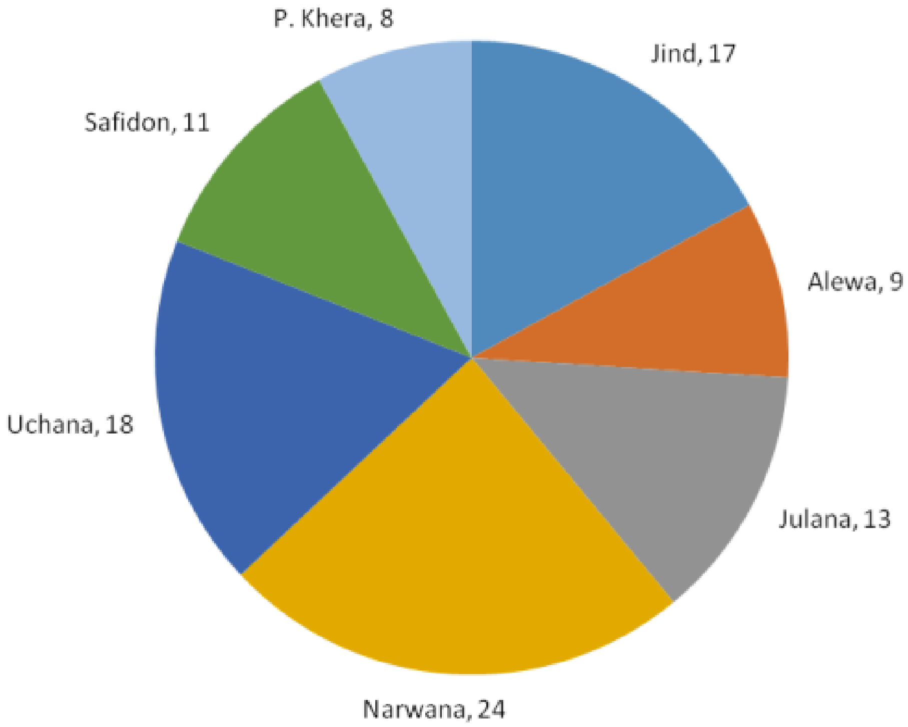


Figure 12 Percent Area of Blocks

2 District Water Profile

2.1 Source of Water

The district is occupied by geological formations of Quaternary age comprising of recent alluvial deposits belonging to the vast Indus alluvial plains.

The ground water occurs in a thick zone of saturation in the alluvium both under confined and unconfined conditions. The shallow aquifers, which are unconfined in nature, are being tapped chiefly by open dug well and shallow tubewell. The deeper aquifers, which are underlain by extensive confining clays, occur under confined conditions.

A buried river channel of Ghaggar running in East-North - East to West- South-West direction has been located in the eastern part of the area. In Safidon -Jind tract tubewells have been constructed within a depth of 80 to 100 m bgl encountering fresh water zones with 25m to 35m of granular material comprising coarse sand, gravel and pebble.

The district Jind constitutes a part of the Punjab -Haryana plain, which is largely flat, featureless and monotonous alluvial upland plain and is formed of Pleistocene and sub recent alluvial deposits of the Indo-Gangetic system. The area of Jind district is irrigated by two canal systems, viz the Western Yamuna Canal and the Bhakra Canal1. The Narwana and Barwala link canals of the Bhakra Canal system interlink these two systems. The major sources of water availability are shallow tube wells and major & medium irrigation canals. Other sources of water availability include deep tube wells and untreated effluents from STP. As per 2015-16 data provided by irrigation department and ground water department, the total annual water availability of the district was 1672.471 MCM, out of which share of surface water is 380.14 MCM (22.72%) and ground water 1292.331 MCM (77.28%). As per Central Ground Water Board report 2013, the status of ground water is overexploited in 3 blocks namely Alewa, Narwana and Safidon; Critical in 1 block namely Jind; and semi critical in 3 blocks namely Julana, Uchana and Pilukhera.

2.1.1 Canals

It can be observed that Jind block has highest canal command in the district followed by Julana block and Narwana block. Total developed canal command of the district is 1,04,504 Ha, undeveloped canal command is 3,23,749 Ha. The developed canal command is highest in Narwana block, followed by Jind block and followed by Uchana block, which is shown in **Table 4**.

Table 4 Status of Canal Command

S. No.	Name of the Block	Information of Canal Command (Ha)		
		Total Area	Developed Area	Undeveloped Area
1	Jind	134382	22219	112163
2	Pilukhera	45597	9460	36137
3	Julana	81681	8914	72767
4	Safidon	24008	7079	16929
5	Alewa	23622	6822	16800
6	Narwana	67324	32972	34352
7	Uchana	51639	17038	34601
	Total	428253	104504	323749

2.1.2 Ponds

The command area in the district can be categorized as Canal command and other services command, which encompasses command created by ponds, tanks and tube wells. The map of water bodies in Jind district is shown in **Figure 13.**

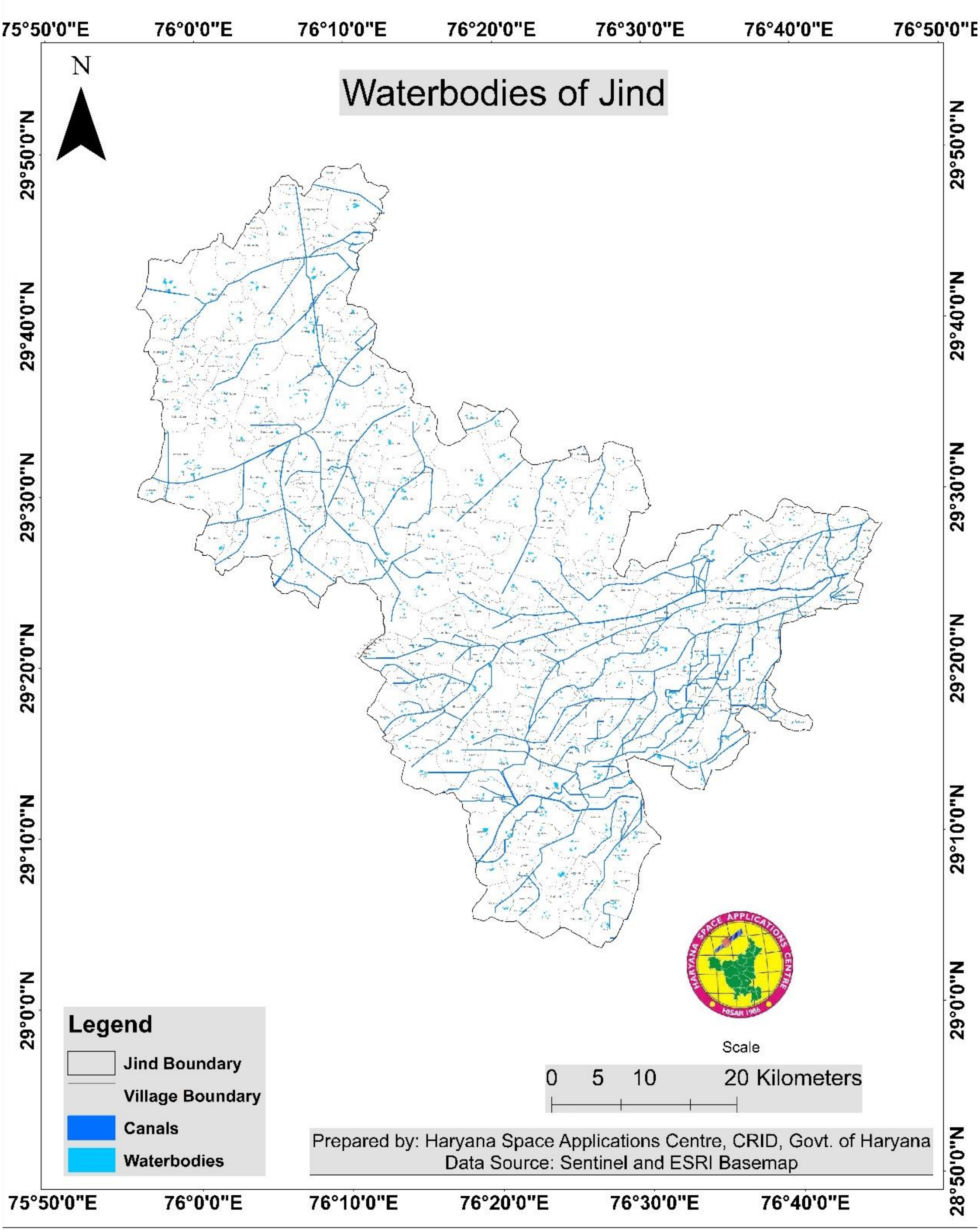


Figure 13 Water bodies of Jind District

2.1.4 Drain

Natural drainage means a drainage consisting of native soils such as a natural swale or topographic depression, which gathers or conveys run-off to a permanent or intermittent watercourse or waterbody. During rain or irrigation, the fields become wet. The water infiltrates into the soil and is stored in its pores. When all the pores are filled with water, the soil is said to be saturated and no more water can be absorbed; when rain or irrigation continues, pools may form on the soil surface. Surface drainage is the removal of excess water from the surface of the land. The drainage of Rewari District is shown in **Figure 14** and the statistics of length of drainage of Rewari district is shown in **Table 5**.

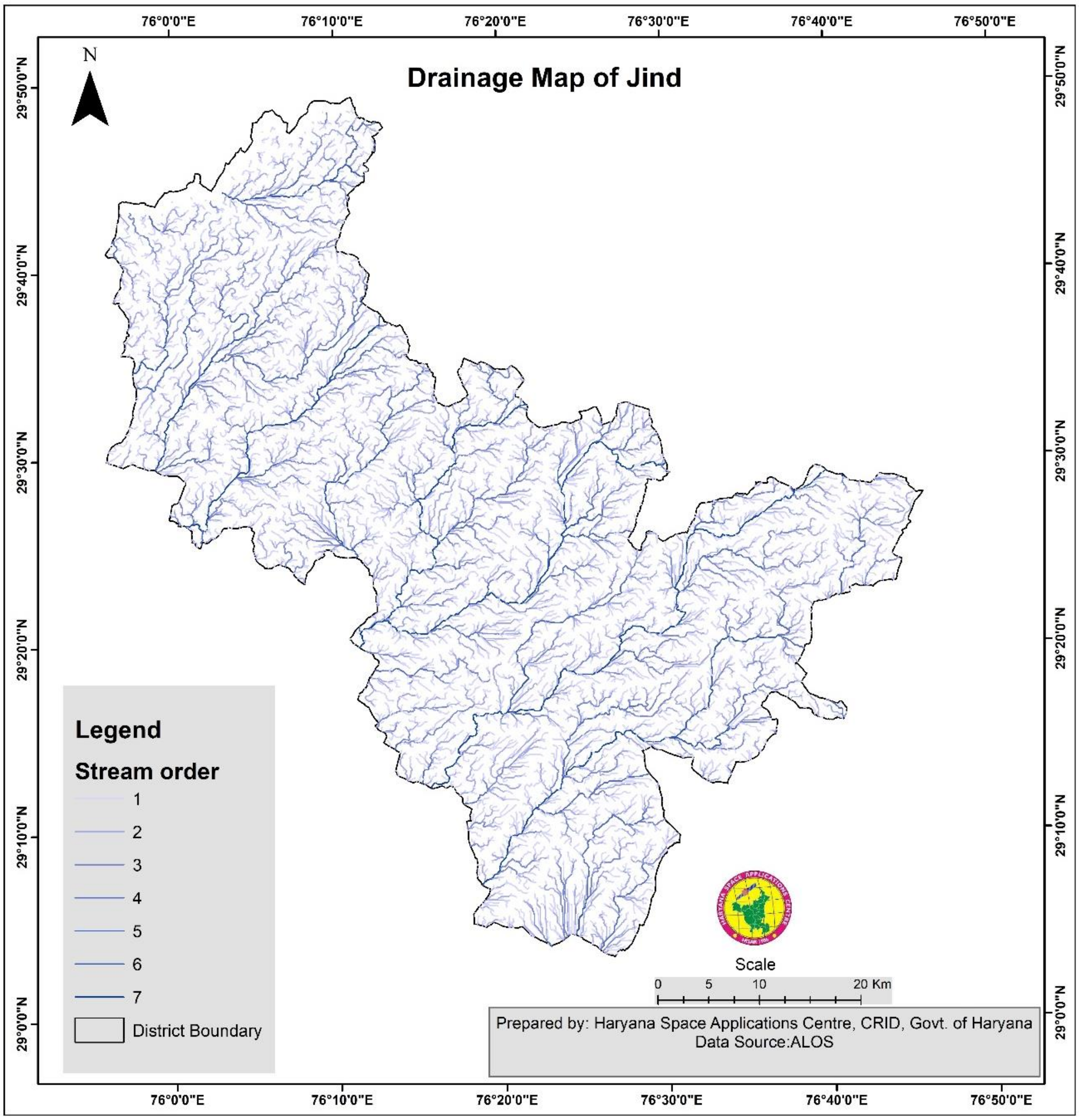


Figure 14 Water bodies of Jind District

Table 5 Drainage order and total length of the drains in Jind district

Stream Order	Length (in meters)
1st	2662233.711644
2nd	1424357.417972
3rd	715817.155916
4th	358997.550025
5th	103529.809521
6th	234779.675996

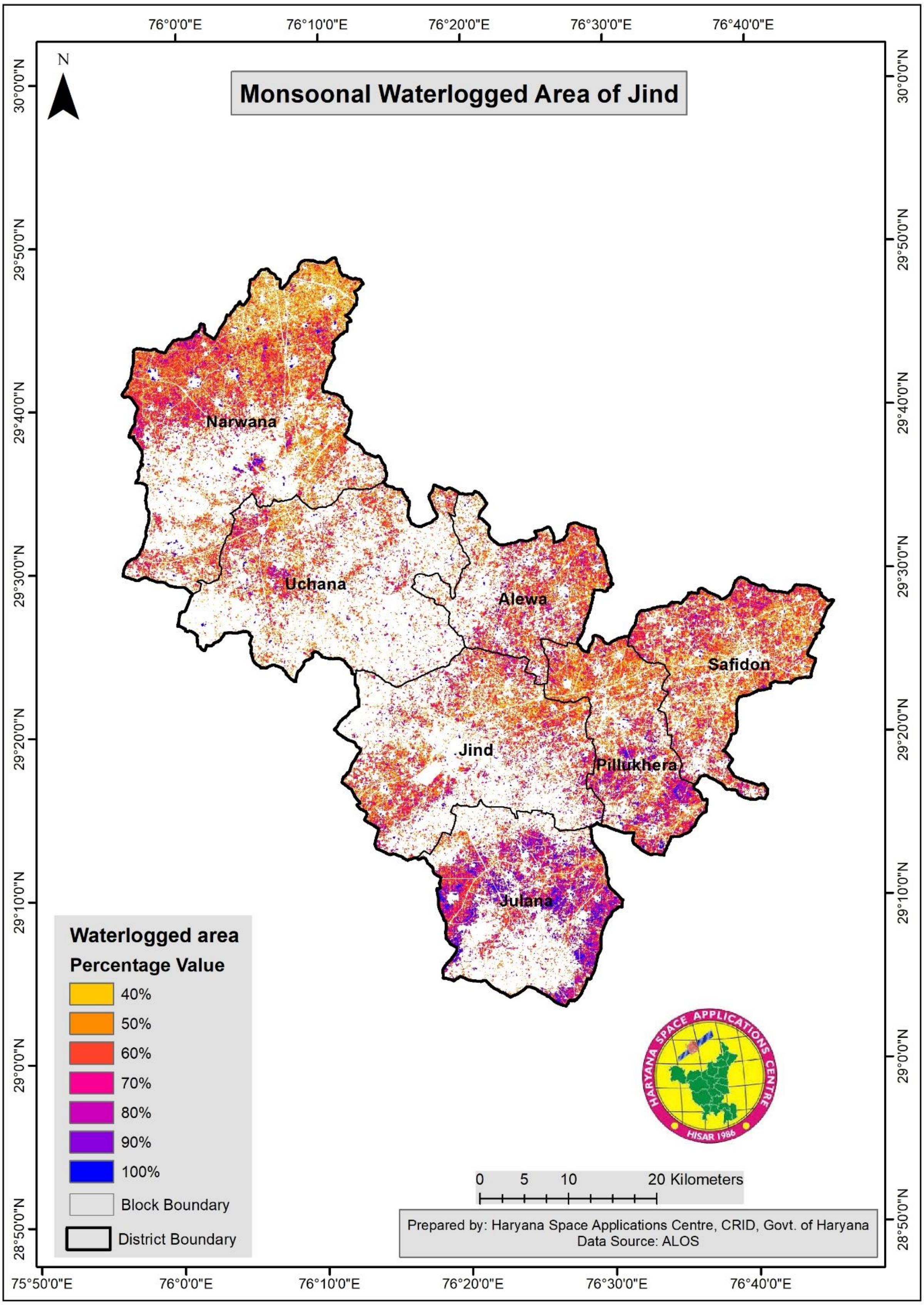


Figure 15 monsoon waterlogged area of the district

2.2 Water Harvesting System

The rapid growth of rural population leads to escalation of water demand. Conservation of ground water is important because it takes years to be replenished. In areas where ground water is used, care must be taken to replenish with rainwater is shown in Table 7.

2.2.1 Roof Top Harvesting

Rooftop water harvesting structure (private) are 80 in numbers. There are a number of different ways to harvest rain water. But the one most essential thing that is common in all the available water conservation techniques is to utilize natural rainwater to supplement the daily life's water consumption. People in the city are becoming all the more conscious day by day in implementing the best possible water conservation techniques. The major benefits of harvesting natural rainfall are that the water can be harvested on a small-scale basis, such as on a bungalow or in housing societies, and it can also be done on a large-scale basis, such as at industrial level.

Many commercial premises have incorporated rainwater harvesting system in their building. And slowly, a lot of housing societies are also incorporating this technique. Harvesting rainwater involves the installation of a very simple technology that can be used by both commercial as well as residential places to make a tiny difference for a good cause. Mentioned below, in **Table 6** are some of the most popular rain water harvesting techniques:

Table 6 Water Harvesting Dashboard

S.NO.	**Activity Name**	**Works Completed**	**Works Ongoing**	**Expenditure (in Lakhs)**
Water Conservation and Rain Water Harvesting				
1	Check Dam		0	
2	Pond / Tank		5	
3	Trench	10	0	
4	Rooftop Water Harvesting Structure (Public)	139	0	
5	Rooftop Water Harvesting Structure (Private)	80		

6	Other Rainwater Recharge Structures (Open Well Recharge, Sand Filter for open well recharge)		0	
7	Other Water Conservation Structures (Bench Terracing, Canal)		1	
Total			**6**	**283**
Renovation of Traditional and other Water Bodies / Tanks				
1	Traditional Water Bodies Restored	929	88	
Total		**929**	**88**	**965**
Reuse and Recharge Structures				
1	Soak Pit	1519	0	
2	Stabilization Pond	2	0	
3	Other Reuse / Recharge Structure	164	0	
Total		**1685**	**0**	**2**
Watershed Development				
1	Gully Plug	0	0	
2	Percolation Tank		21	
3	Staggered Trenches	0	0	
4	Other Watershed Construction Activities	295	166	
Total			**187**	**1591**
Intensive Afforestation				
1	Intensive Afforestation-Nurseries	79	1	
2	Intensive Afforestation- Plantation		18	
Total			**19**	**39**
Awareness Programs by KVK				
1	Farmer’s training programs by KVKs on Water Use Efficiency and Appropriate Crops	8		
2	Distribution of one packet of vegetable seeds and saplings of five nutritious plants to farmers			
3	Awareness Programs/ Kisan Mela on the theme Valuing Water	726		
Total		**734**		

Waste Water Treatment				
1	Use of Treated Waste Water	0		
Total		**0**		

2.2.2 WHS other than roof top

Other Rainwater Recharge Structures (Open Well Recharge, Sand Filter for open well recharge) are also in Jind is shown in Figure 15.

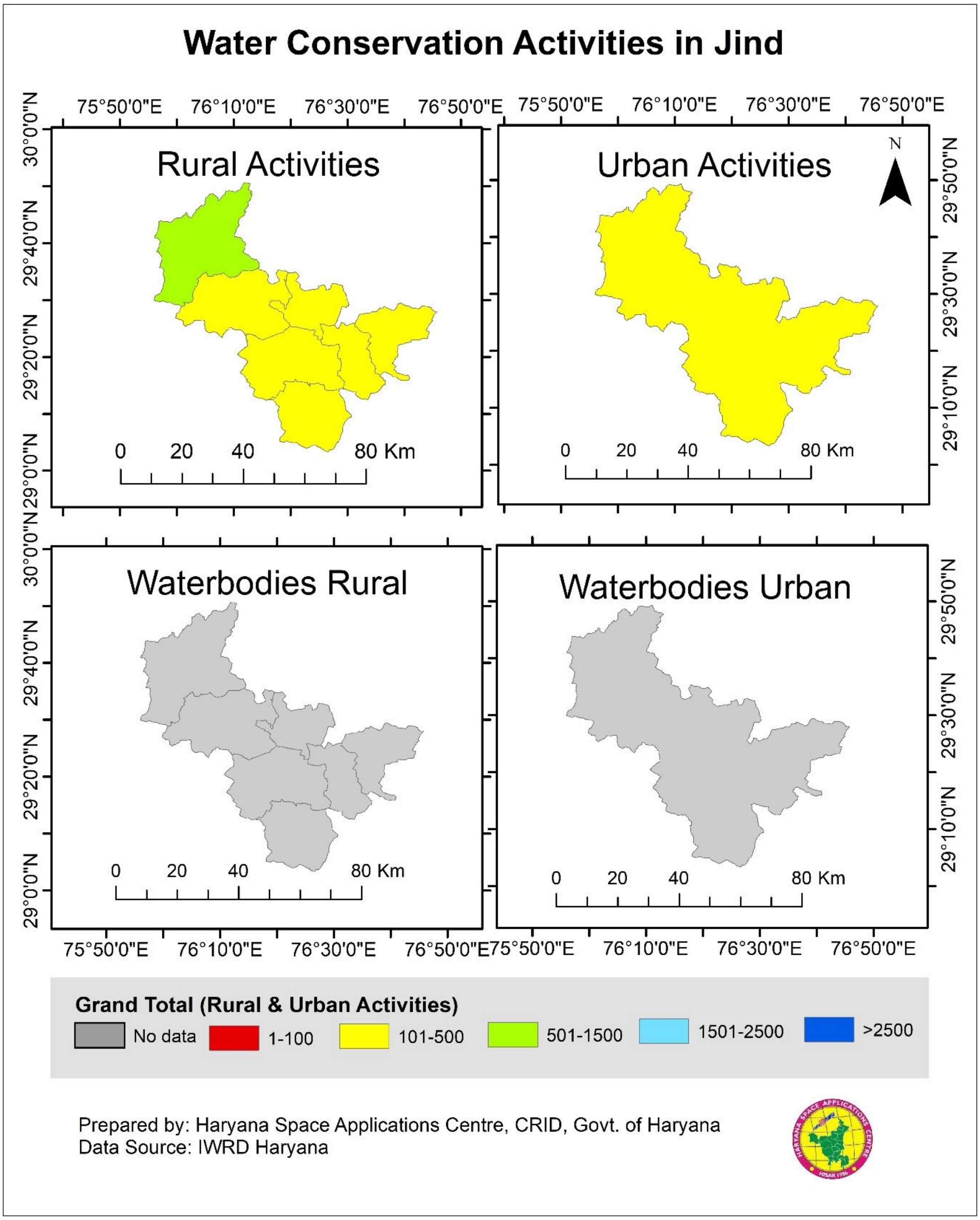


Figure 16 Water Conservation Activity in Jind District

Table 7 Water Harvesting activities in Rural area and Urban Area

In Rural Area		
Sr. No	**Block Name**	**Total Activity**
1	Jind	320
2	Safidon	354
3	Julana	637
4	Pilukhera	325
5	Alewa	324
6	Uchana	250
7	Narwana	327
In Urban Area		
1	Jind	142

2.2.3 Sewerage Treatment Plant

Sewage treatment plant means any arrangement of devices and structures used for treating sewage. Sewage from every residential colony, hotel, or corporate office collected in the sewage collection system.

There is one Common Effluent Plant & one Biomedical Waste Management Site in Jind District is shown in **Figure 16**.

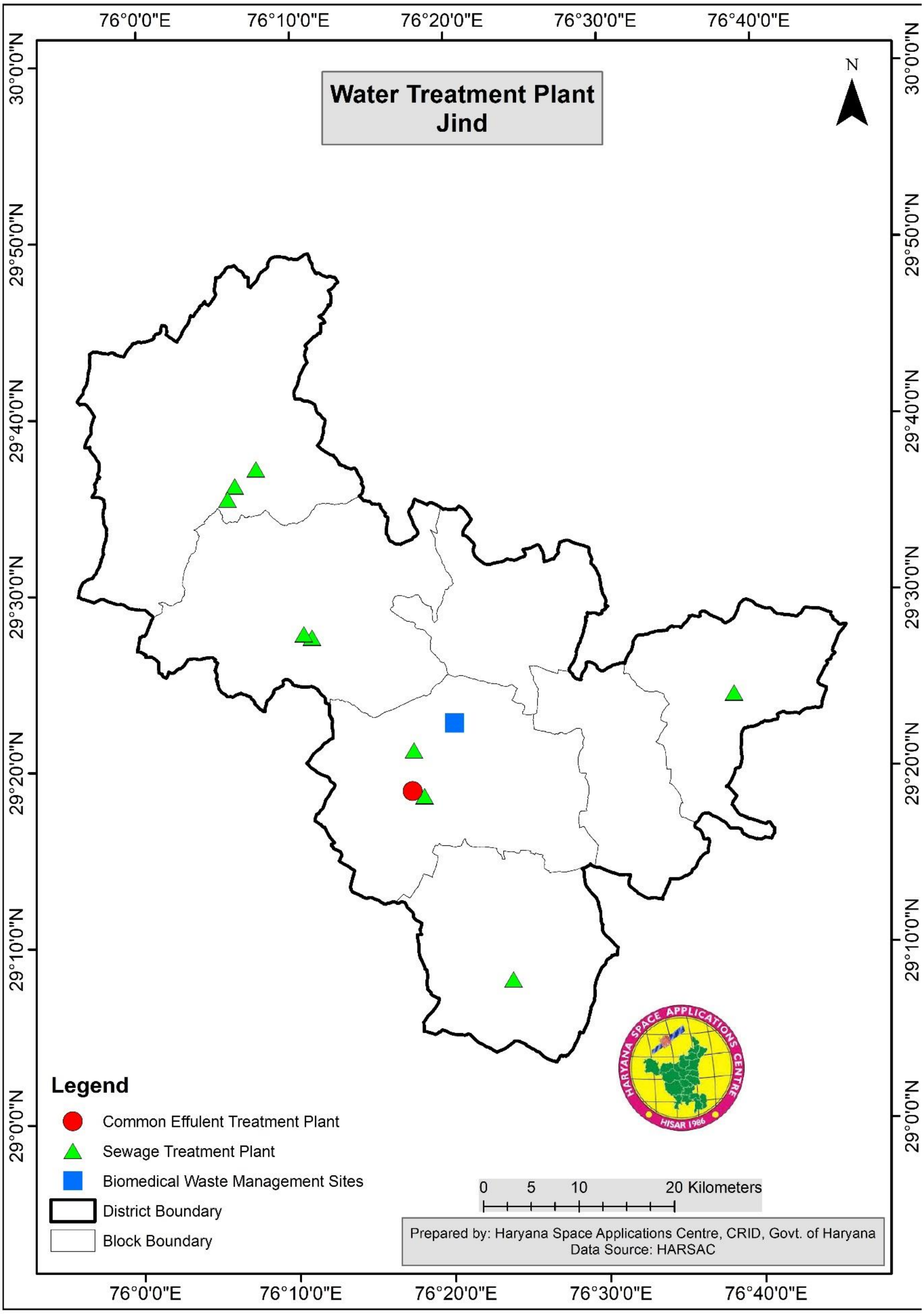


Figure 17 Water Treatment Plant Map of Jind District

3 Irrigation Profile

Irrigation is the agricultural process of applying controlled amounts of water to land to assist in the production of crops as well as to grow landscape plants and lawns, where it may be known as watering. Agriculture that does not use irrigation but instead relies only on direct rainfall is referred to as rain-fed. Irrigation helps to grow agricultural crops, maintain landscapes, and revegetate disturbed soils in dry areas and during periods of less than average rainfall. Irrigation also has other uses in crop production, including frost protection, suppressing weed growth in grain fields and preventing soil consolidation. Types of Irrigation is shown in **Table 8**.

3.1 Gravitational Irrigation

The sources of irrigation in Jind include Tube Well (Shallow &Deep) and Irrigation Canals. The area of Jind district is irrigated by two canal systems, viz. the Western Yamuna Canal and the Bhakra Canal. The Narwana and Barwala link canals of the Bhakra Canal system interlink these two systems. Earlier due to the seasonal fall in the river Yamuna, the source of Western Yamuna (Jumna) Canal, there was a fall in its discharge at the canal headwork, which resulted in rotational closures for its various branches. With the augmentation of water supply from Bhakra Canal through the Narwana and Barwala Link Canals and Augmentation Canal, the supply in the Western Yamuna Canal had been fully replenished and its various branches running in the district have now regular supplies.

3.2 Lift Irrigation

Lift irrigation schemes must accomplish two main tasks: first, to carry water by means of pumps or other way, from the water source to the main delivery chamber, which is situated at the top most point in the command area. Second. They must distribute this water to the field of the beneficiary farmers by means of a suitable and proper distribution. So that in Lift Irrigation system, the gravity flow of water by canals or river is not available or used.

Table 8 Existing Type of Irrigation

Block		Surface irrigation (1)		Ground Water (2)			Total	
		Govt. canal	Community Ponds	Private Tube well	Water extracti ondevices			
					Electricity Pump	Diesel Pump	Irrigation sources	Water extracting units
Jind	Nos	28	81	16020	9426	4443	16129	13869
	CA (Ha)	16163		17618			33311	
Alewa	Nos	9		6161	4900	188	6170	5088
	CA (Ha)	7027		9413			30196	
Julana	Nos	18	70	11827	1289	8192	11915	9481
	CA (Ha)	10253		15336			38264	
Narwana	Nos	23		17700	12873	4827	17723	17700
	CA (Ha)	32972		26056			80151	
Uchana	Nos	21	18	16188	4809	10306	16227	15115
	CA (Ha)	17038		20369			48834	
Safidon	Nos	15		11196	7736	2387	11211	10123
	CA (Ha)	8149		11614			45044	
PilluKhera	Nos	21	69	11045	4404	4370	11135	8774
	CA (Ha)	10104		9034			45668	
Total	Nos	135	238	90137	45437	34713	90510	80150
	CA (Ha)	101706		109440			321468	

4 Water Availability

The district Jind constitutes a part of the Punjab -Haryana plain which is largely flat, featureless and monotonous alluvial upland plain and is formed of Pleistocene and sub recent alluvial deposits of the Indo-Gangetic system. It is dotted only sporadically with sand dunes and depression, yielding a local relief of not more than 6m. The district does not offer much physiographic diversity. Most of the rainfall (app. 80%) occurs from the middle of June to September. Flash floods are mainly caused by heavy rains during this period. During winters, some cyclonic rainfall occurs mainly from January to March. There is no perennial river in the district. Only a small river Chautangnadi enters the district near the village Mundh and debouches near village Bosini into Karnal district after covering about a distance of ten kilometers in Jind district.

Sources of Irrigation:

The sources of irrigation in Jind include: Tube Well (Shallow &Deep) and Irrigation Canals. The area of Jind district is irrigated by two canal systems, viz. the Western Yamuna Canal and the Bhakra Canal. These two systems are interlinked by the Narwana and Barwala link canals of the Bhakra Canal system. Earlier due to the seasonal fall in the river Yamuna, the source of Western Yamuna (Jumna) Canal, there was a fall in its discharge at the canal headwork which resulted in rotational closures for its various branches. With the augmentation of water supply from Bhakra Canal through the Narwana and Barwala Link Canals and Augmentation Canal the supply in the Western Yamuna Canal had been fully replenished and its various branches running in the district have now regular supplies. **(Table 9)**.
Western Yamuna Canal

The canal takes off from the Yamuna at Tajewala headwork (Ambala district) where a very strong masonry dam is built across the river. The Sirsa branch bifurcates from the main Western Yamuna (Jumna) Canal at lndri (Karnal district). About 49.0 kilometers further down, the Hansi Branch takes off from main branch of the Western Yamuna (Jumna) Canal at Munak. The Sirsa Branch and the Hansi Branch with its Sunder sub branch and their various distributaries irrigate the district.
(A) Sirsa Branch the Sirsa Branch takes off from the Western Yamuna (Jumna) Canal at Indri (Kamal district). This canal irrigates area in the northern part of the Jind district. It was not a perennial canal because with the recession of flow in the Yamuna, not all the distributaries of the Western Yamuna (Jumna) Canal could be simultaneously fed. Hence the different distributaries were rotational.
In 1954, the Narwana Branch of the Bhakra Canal was excavated with its outfall into the Sirsa Branch near Budhera, a village ten kilometers south-west of Thanesar and in 1972, another feeder channel, namely, Barwala Link Canal was constructed to pour water from Bhakra Main Line Canal into Sirsa Branch. The Sirsa Branch system was reoriented with its shifting from Western Yamuna (Jumna) Canal to Bhakra Canal. The distributaries which take off from Sirsa Branch and provide irrigation in the Jind

district are Habri subbranch with its Jakhauli and Rajaund distributaries, Sudkian distributary, Dhanauri distributary, Dhamtan distributary, Barwala Branch with its Surbra distributary and Pabra distributary.

(B) Hansi Branch

The Hansi Branch takes off from western Yamuna Canal at Munak and enters the District near Anta Village in Safidon Tehsil. With augmentation of water supply from Bhakra Canal and Augmentation Canal, the Hansi Branch was made perennial. The distributaries which take off from Hansi Branch and provide irrigation in the Jind district are Jind distributaries No. 1-8, Muana distributary and Butana Branch and Sunder sub-branch. The Butana Branch takes off at R.D. 58,310 of Hansi Branch and Sunder sub-branch from Butana Branch at RD. 1, 74,920. A number of direct outlets and minors irrigate southern part of district. Narwana Branch Link Canal, the Sarusti distributary and Nardak distributary of Narwana Branch Link Canal irrigate some areas of the Jind district in its tail reaches. The Sarusti distributary takes off from Bibipur lake and irrigates the district through Khanauri and Haripur minors. The Nardak distributary takes off from Narwana Branch Link Canal at R.D. 54,249 and irrigates some areas through Uplana, Salwan, Padana, Rodh, Moana, Kaul and Tail minors.

Table 9 Status of Water Availability of Jind District

Source	Volume of water (in MCM)		
	Kharif	Rabi	Total
Surface Irrigation			
Canals	181.96	185.8	367.76
Treated Effluent STP	2.1	2.1	4.2
Un treated Effluent	4.09	4.09	8.18
Sub-Total	188.15	191.99	380.14
Ground Water			
Deep Tube well	0.28	0.371	0.651
Shallow Tube well	667.4	624.28	1291.68
Sub-Total	667.68	624.651	1292.331
TOTAL	855.83	816.641	1672.471

It can be observed that the major sources of water availability are shallow tube wells and major & medium irrigation canals. Other sources of water availability include deep tube wells and untreated effluents from STP. The total annual water availability of the district 45 is 1672.471 MCM, out of which share of surface water is 380.14 MCM (22.72%) and ground water 1292.331 MCM (77.28%) **(Figure 17).**

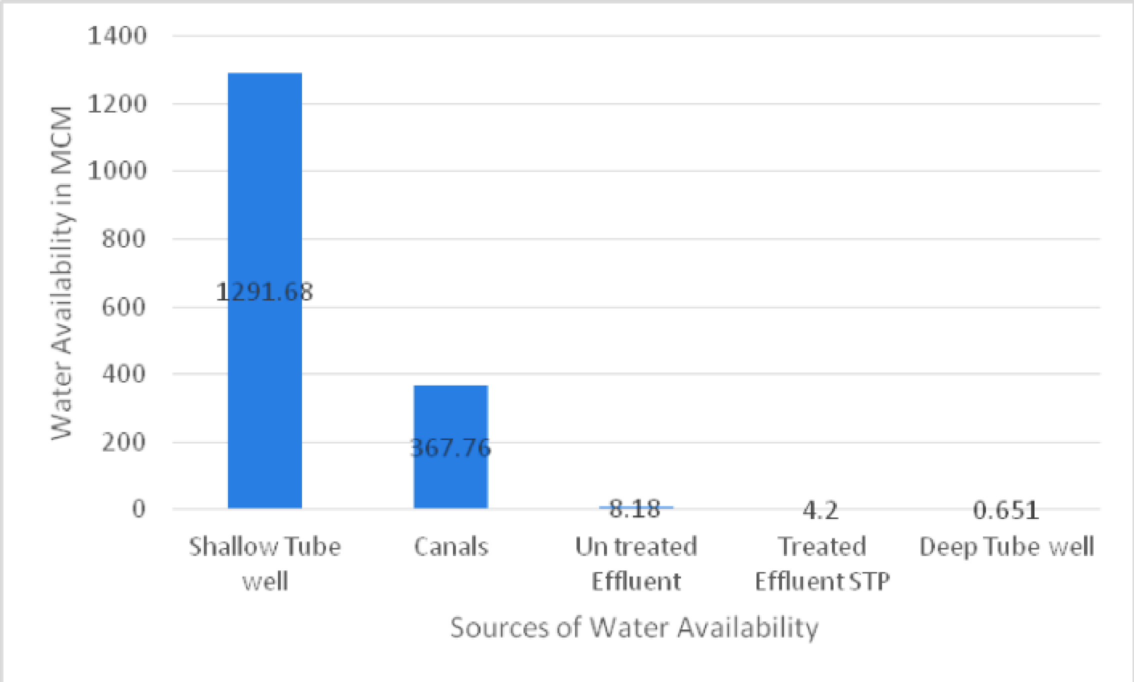


Figure 18 Status of Water Availability

4.2 Ground Water Availability

Groundwater has come up as a remarkable resource of water supply. Its more and more need in agriculture, industries and domestic sectors makes it as an asset of vital concern **(Figure 18).**

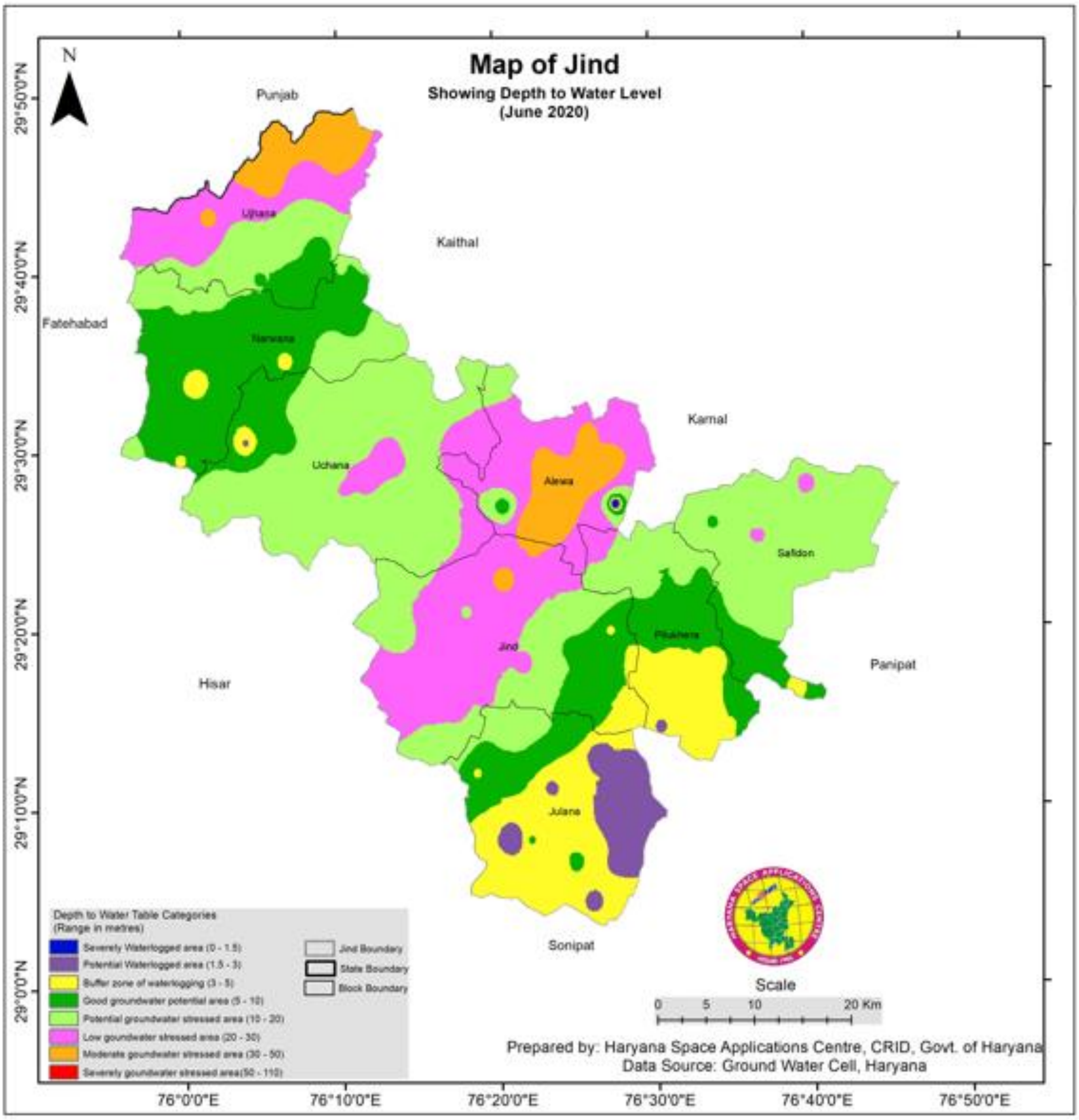


Figure 19 Ground water Availability Map of Jind District

Ground water is the main source of drinking in the district covering 307 nos. of villages. The use of ground water for irrigation purpose in non-command area is maximum. The ground water development in the district is mainly for domestic and irrigation purposes. As per Central Ground Water Board report 2013, the status of ground water is Over-exploited in 3 blocks namely Alewa, Narwana and Safidon; Critical in 1 block namely Jind; and semi critical in 3 blocks namely Julana, Uchana and Pilukhera. None of the blocks of district falls under safe category. Block wise status of ground water and total draft and recharge details are given in following **Table10** & Ground Water Resource and Development Potential of Jind District is shown in **Table 11**.

Table 10 Status of Ground Water Availability

S No.	Block	Status of block as per CGWB notification 2013				Ground water (MCM)		
		Over-exploited	Critical	Semi-Critical	Safe	Draft	Recharge	Gap
1	Jind		Yes			155.44	187.35	-31.91
2	Alewa	Yes				70.17	62.88	7.29
3	Julana			Yes		71.17	82.97	-11.8
4	Narwana	Yes				174.28	145.07	29.21
5	Uchana			Yes		84.28	101.79	-17.51
6	Safidon	Yes				139.57	138.54	1.03
7	P. Khera			Yes		78.72	98.54	-19.82

Table 11 Ground Water Resource and Development Potential of Jind District, Haryana (in ha m)

Block	Net annual ground water availability(ham)	Existing gross ground water draft for irrigation (ham)	Existing gross ground water draft for all uses (ham)	Provision for domestic &industrial requirementsupply to 2025 (ham)	Net annual ground water availability for future irrigation development(ham)	Stage of ground water development(%)	Category
Alewa	5839.24	6644	7207.44	539.26	0	123	OVER EXPLOITED
Jind	18500.15	21541.66	22727.24	928.56	0	123	OVER EXPLOITED

Julana	6006.07	2856.5	2988.49	116	3018	50	SAFE
Narwana	4625.27	2900.61	3048.06	66	1577	66	SAFE
Pilukhera	7905.43	5932.44	6283.22	314.1	1622	79	SEMI CRITICAL
Safidon	12023.53	16613.99	17407.63	772.63	0	145	Over Exploited
Uchana	14671.1	16386.93	16782.77	370.54	0	114	Over Exploited
Ujhana	7526.67	10298.58	10550.74	252.16	0	140	Over Exploited
Total	**81714**	**83174.71**	**86995.6**	**3359.26**	**6217**	**840**	

4.2.1 Ground Water Quality

The district is occupied by geological formations of Quaternary age comprising of recent alluvial deposits belonging to the vast Indus alluvial plains. The ground water occurs in a thick zone of saturation in the alluvium both under confined and unconfined conditions. The shallow aquifers, which are unconfined in nature are being tapped chiefly by open dug well and shallow tube well. The deeper aquifers, which are underlain by extensive confining clays, occur under confined conditions. A buried river channel of Ghaggar has been located in the eastern part of the area. In Safidon -Jind tract tube wells have been constructed within a depth of 80 to 100 m bgl encountering fresh water zones with 25m to 35m of granular material comprising coarse sand, gravel and pebble. The ground water extraction in the district is being done by Tube 49 well and bore wells.

The results of chemical analysis of ground water samples in the phreatic aquifer (dug well zone) indicate that Ground water is alkaline in nature (pH values ranges between 8.07 to 9.08). Ground water is moderately to highly saline. The electrical conductivity ranges from 270 µs/cm at 250C (Ramarae) to 8590 µs/cm at 250C (Lawan). On the perusal of Iso conductivity map, it is seen that in a major part of the district conductivity ranges from 250 to 2000 µs/cm at 250C indicating fresh ground water. In the blocks of Narwana and parts of Uchana area, the conductivity values greater than 2000µs/cm at 250C have been recorded. Whereas formation water from deeper aquifer shows that the electrical conductivity ranges from 17000 at Uchana to 24000µs/cm at Paoli at 250C **(Figure 19) & Table 12.**

The chemical parameters in many samples are beyond the permissible limits for safe drinking water criterion. Sulphate and Nitrate values were found more than permissible limit at location Chabari and Kanchana Khurd. Fluoride values were found to be more than permissible limits at seven locations. Highest value of 19.36 was observed at Korawal. Arsenic values were found more than permissible limit at 3 locations. Samples of Safidon, Shabuddinpur and Kalwan have been reported to have values 0.013 mg/l,
0.015 mg/l and 0.023 mg/l respectively.

Generally, Calcium has been found to be dominant cation and Cl as dominant anion. Hence the ground water is of Ca-Cl type. Ground water is fit for drinking in large part of the district but have been found unfit in isolated patches.

The suitability of ground water for irrigation is generally ascertained by the values of salinity, SAR and RSC. SAR and RSC values ranges between
0.71 to 22.11 and (-) 5.70 to 16.30 respectively.

Table 12 Block wise average water quality index value in Rewari District

Block Name	**Average Water Quality Index Value**
Jind	193.08
Safidon	113.17
Julana	183.49
Pilukhera	134.16
Alewa	160.46
Uchana	169.06
Narwana	130.48

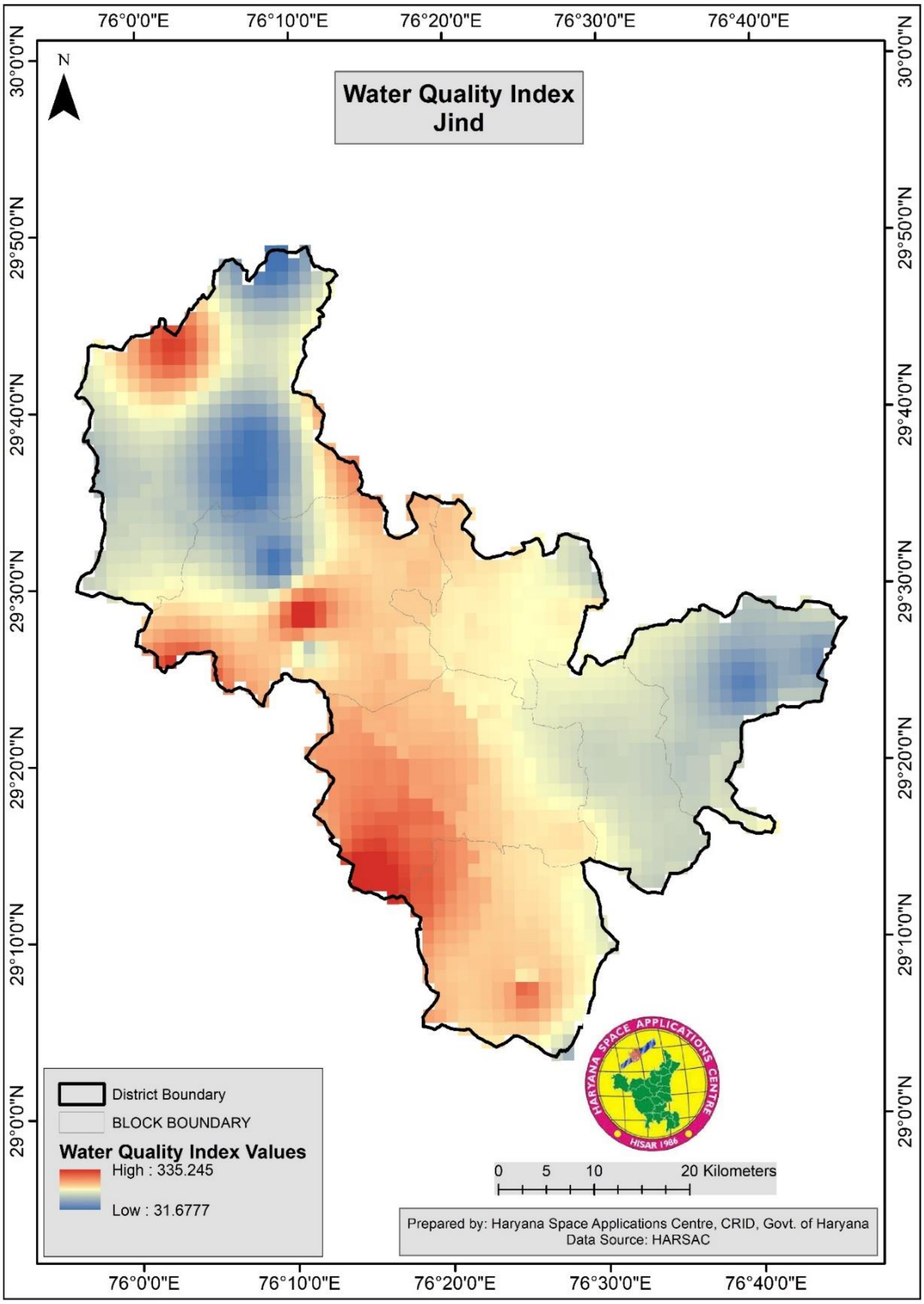


Figure 20 Water quality index of Jind District

5 Water Requirement/ Demand

5.1 Water Supply and Gap

The present & projected water demand from various sectors such as domestic, livestock, agriculture, industrial and power in the district is assessed. The total present water demand from various sectors is 2466.03 MCM, while future water demand (2022) will be 2470.61 MCM. To meet this demand, total of 380.14 MCM of surface water and 1292.331 MCM of ground water are available in the district. Therefore, the present water gap is to the tune of 793.559 MCM, and the projected water gap (2022) shall be to the tune of 798.139 MCM. To bridge this gap, strategic action plan has been prepared by various departments.

5.1.1 Domestic Water Demand

To assess present population (2016) and future population (2022), an annual growth rate of 1.21% is assumed, based on the decadal growth in population from census 2001 to census 2011. To assess water demand, requirement of 100 lpcd for rural and 140 lpcd for urban are assumed **(Table 13) &** Projected Domestic Water Demand (2022) **(Table 14).**

Table 13 Present Domestic Water Demand (2016)

Blocks	Present Population (2016)			Present Gross Water Demand in (MCM)		
	Rural	Urban	Total	Rural	Urban	Total
Jind	202709	177731	380440	7.4	9.08	16.48
Julana	136984	19890	156874	5	1.02	6.02
Alewa	94958	0	94958	3.47	0	3.47
Uchana	191105	17832	208937	6.98	0.91	7.89
Narwana	238838	65846	304684	8.72	3.36	12.08
Pilukhera	90927	5942	96869	3.32	0.3	3.62
Safidon	135275	36829	172104	4.94	1.88	6.82
Total	1090796	324070	1414866	39.83	16.55	56.38

It can be observed that total present domestic water demand is 56.38 MCM. The share of water demand from rural areas is 39.8 MCM (i.e., 70.64%), and from urban areas is 16.55 MCM (i.e., 29.36%).

Table 14 Projected Domestic Water Demand (2022)

Blocks	Projected Population (2022)			Future Gross Water Demand in (MCM)		
	Rural	Urban	Total	Rural	Urban	Total
Jind	216586	189898	406484	7.91	9.7	17.61
Julana	146361	21251	167612	5.34	1.09	6.43
Alewa	101459	0	101459	3.7	0	3.7
Uchana	204188	19053	223241	7.45	0.97	8.42
Narwana	255189	70354	325543	9.31	3.6	12.91
Pilukhera	97152	6349	103501	3.55	0.32	3.87
Safidon	144536	39350	183886	5.28	2.01	7.29
Total	1165471	346255	1511726	42.54	17.69	60.23

It can be observed that projected future domestic water demand (2022) is 60.23 MCM, and will increase by 6.82%, as compared to present domestic water demand (2016).

5.1.2 Crop Water Requirement

It can be observed that total water demand of agriculture crops of the district is 2347.66 MCM, and existing potential is 2295.27 MCM. Therefore, water potential of 52.39 MCM needs to be created in the district for meeting the water requirement of agriculture crops. The water potential to be created is highest in Narwana block, followed by Julana block, Uchana block and Jind block. Since the Safidon block is totally irrigated, water potential to be created is Nil **(Table 15).**

Table 15 Block wise water demand- Agriculture Crops

Block	Area Sown (ha)	Irrigated Area (ha)	Crop wate rdemand (MCM)	Existing wate rpotential (MCM)	Water potential to be created (MCM)
Jind	77690	74700	388.89	378.51	10.38
Julana	59298	55112	282.69	269.49	13.2
Alewa	42536	41855	216.54	213.93	2.61
Safidon	52135	52135	280.63	280.63	0
Pilukhera	39075	39002	210.01	209.69	0.32
Uchana	88930	85567	404.82	392.79	12.03

Narwana	113787	109993	564.08	550.23	13.85
Total	473451	458364	2347.66	2295.27	52.39

5.1.3 Livestock Water Requirement

As per livestock census 2007 & 2012 the annual growth in the population of small animals can be considered as 15.17% (in case of poultry), 1.038% (in case of goats), -6.4% (in case of pigs) and -7.27% (in case of sheep). In case of large animals, annual growth in the population can be considered as 0.08% (in case of buffalo), -0.32% (in case of cattle), -2.64% (in case of horses & ponies),-1.718% (in case of mules &donkeys) and -14.05% (in case of camels).Accordingly, the present livestock population (2016) and future livestock population (2022) is assessed. The table below represents the animal wise water requirement as well as total water requirement of the district for animals. **(Table 16).**

Table 16 Livestock water demand

District	Total Number of livestock	Present water Demand (MCM)	Water demand in 2022(MCM)	Existing Water Potential (MCM)	Water potential to be created (MCM)
Jind	12650592	22.32	23.03	22.32	0.71

It has been assumed that the existing water potential is equal to present water demand of livestock. Thus, the water potential to be created implies the quantum of water availability to be created to meet livestock water demand in 2022. It can be observed that water potential to be created is to the tune of 0.71 MCM for Jind district.

For calculating the livestock water demand, Water requirement for each of the animal is estimated based on the following assumption as per the secondary data received from Animal husbandry department. **(Table 17).**

Table 17 Animal wise water requirement

	Daily Water Demand per animal (Liters)		Daily Water Demand per animal (Liters)
Poultry	0.2	Hybrid Cow	70
Ducks	0.5	Buffalo	100
Pigs	60	Draft Animals	100

Goats	12	Indigenous Cow	50
Sheep	15		

5.1.4 Industrial Water Requirement

Jind is an industrially backward district and there are no big industrial units in the district. There are 9 rice sellers, 2 units of hand -made paper, 46 units of cattle feed, 1 solvent extraction plants, 21oil expelling units, 2 big floor (maida) mill, 10 cotton ginning mill, 1 gypsum board factory, 1 cooperative milk plant and 6 units of straw board/ mixed board in the district. One sugar mill in cooperative sector is situated at Jind.

4.5 Water Demand for Power Generation

The district is not having any thermal or nuclear power plant where water may be consumed. Therefore, demand of water for power generation has been taken as nil. 4.6 Total Water Demand of the district for various sectors This section presents the total water demand of the district and has been calculated by summing up all major sectors consuming water.

5.2 Water Budget

A total of 380.14 MCM of surface water and 1292.331 MCM of ground water are available in Jind district. It can be observed that based on present and projected water demand (2022), and present water availability (surface & ground), the present water gap is to the tune of 793.559 MCM, and projected water gap (2022) is to the tune of 798.139 MCM. **(Table 18).**

Table 18 Water Budget

Existing water availability (MCM)		Total (MCM)	Water demand (MCM)		Water gap (MCM)	
Surface water	Ground water		Present	Projected (2022)	Present	Projected (2022)
380.14	1292.331	1672.471	2466.03	2470.61	793.559	798.139

6 Strategies for Water Conservation

Perusal of the Ground Water Resources available in the district clearly indicate that Northeastern part of the district has high development of ground water resources, sometimes the extent of making the block overexploited. Blocks located in southern and central part have low ground water developed and their development is well within the 50%. Though water quality is good and fit for the purpose of drinking and irrigation these areas, have low ground water development. Hence, ground water draft is not having adverse impact on the ground water levels. Lower level of recorded ground water development may be the combined effect of less draft, more rainfall and suitable hydrogeological conditions and alternate facility for irrigation.

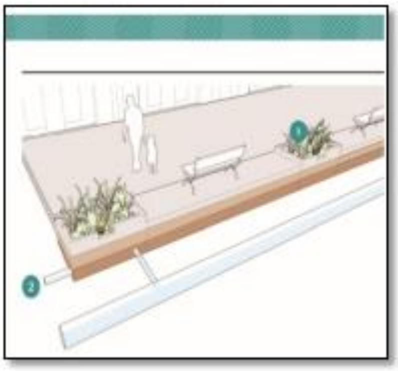
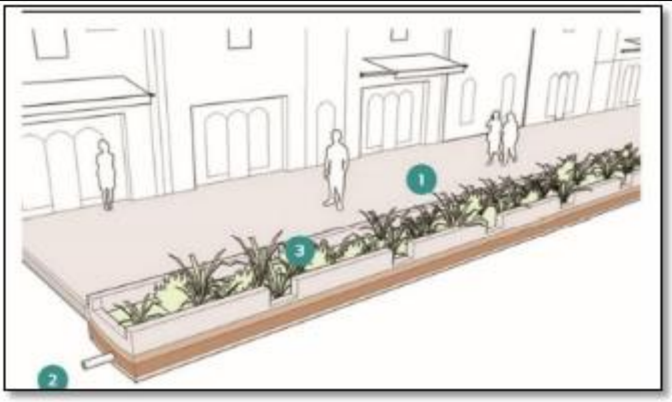
Since the whole area of the district is alluvium and at no place neither basement has been encountered or any cobble, pebble bed, hence appropriate method of drilling in the area would be rotary or reverse rotary.

The ground water at shallow depth up to 40 to 100m is fresh to marginal saline. Tubewells can be constructed up to the depth of 40-100 m for drinking as well as for irrigation purpose depending on the local hydrogeological conditions. Deeper aquifer is largely saline in the district.

6.1 Water Sensitive Urban Design

As more and more portions of the district become urbanized, it is crucial to integrate water sensitive urban design into planning of the major upcoming clusters of towns and cities that are in the satellite of the main city of Ambala. Water Sensitive Urban Design (WSUD) is a familiar concept for engineers and architects practicing and designing in the face of overwhelming environmental changes brought in by climate change. A major part of WSUD also allows us as a society to grow more resilient towards more intensive changes in rainfall patterns, as they grow more intensive, however scarcer in terms of frequency **(Table 19).**

Table 19 Following table shows the methods of water table recharge strategies in urban area

Sr. No.	Method	Image
1	**Flow Through Planters**	 
2	**Pervious Strips**	

3	**Pervious Pavement**	 
4	**Storm water Tree**	

6.2 Plantation (wasteland map)

A major portion of WSUD that is popular within the Government Departments is plantation of various species of plants, both in public and private spaces, to encourage community participation and increase green cover. While increasing the aesthetic value of a location, plants are heavily influential to change microclimates and in fact playing a factor to rainfall patterns. Along with benefits of carbon sequestration, they contribute to increasing the local biodiversity of the region by attracting several types of fauna as well. Currently a multi-departmental approach within Ambala is being undertaken both within and outside of government with the engagement of several active citizen stakeholders and non-governmental organizations. Geo-tagging of these plantations and survival monitoring would be undertaken actively by engagement of the mentioned stakeholders. Wasteland Map Jind District is shown in **(Figure 21) & Table 20.**

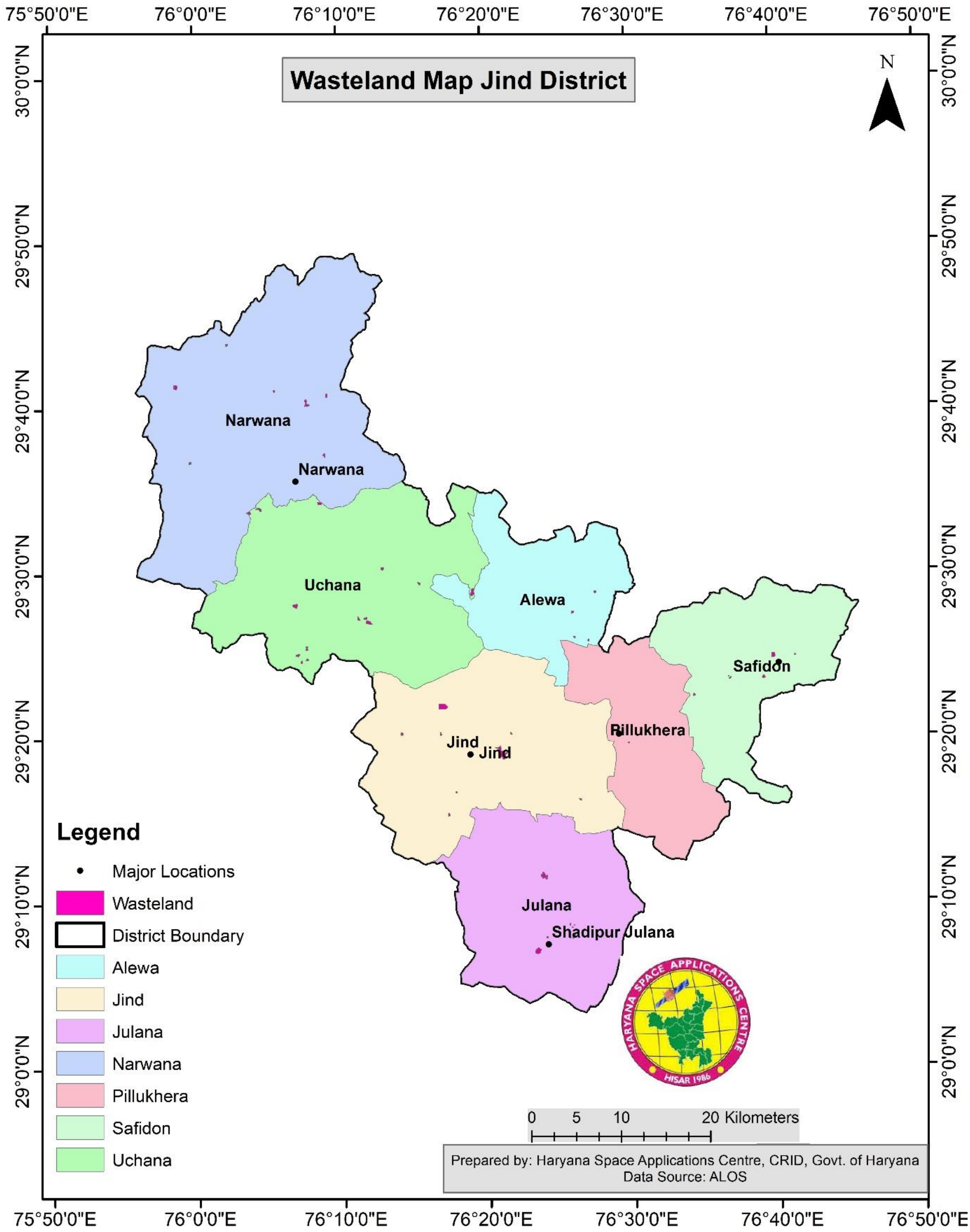


Figure 21 Wasteland Map Jind District

Table 20 Wasteland map of Jind District

Block Name	Wasteland Area (feet)	Plantation (potential) at 5 feet spacing
Jind	14042049.8	2808410
Safidon	3757651.1	751530.2
Julana	8074115.3	1614823
Pilukhera	222233.9	44446.78
Alewa	1776374.9	355275
Uchana	14544544.6	2908909
Narwana	6348763.9	1269753
Total	48765734	9753147

6.3 Surface water management

6.4.1 Pond restoration and rejuvenation

The following measures are recommended to minimize the declining ground water trend in parts of the Jind district as safeguard against environmental degradation.

Half glass water concept in government offices.

Handed over each plant to persons by name so that they feel personally attached with plant.

It is necessary to notify the district for regulation of all ground water abstraction structures and the construction of any tubewell in Safidon blocks of the district, prior permission should be sought from the Central Ground Water Authority.

Artificial recharge to ground water should be taken up in the urban and rural area to avert the further lowering of ground water level since natural recharge to the aquifer system is not adequate to support such ground water withdrawal. In this context, Alewa, Narwana and Safidon blocks are recommended for artificial recharge practices.

A modern agricultural management has to be taken into account for effective water management techniques involving economics distributors of water monitoring minimum hours of pumping and also by selecting most suitable cost-effective crop pattern so that even high TDS water may be suitable for irrigation for salt tolerant crops. The modern methods of irrigation like sprinkler, drip irrigation etc. should be used.

Local populace to be educated regarding consequences of mining of ground water and need for its effective/economic use.

6.4.2 Decentralize Treatment Plant

It is recognized that in the absence of 100% sewerage network connectivity just managing the gray water component would be an incomplete solution. In the rapidly urbanizing cities of developing countries, decentralized wastewater treatment systems are an attractive solution for addressing the problems of water pollution and scarcity.

Decentralized wastewater treatment consists of a variety of approaches for collection, treatment, and dispersal/reuse of wastewater for individual dwellings, industrial or institutional facilities, clusters of homes or businesses, and entire communities. An evaluation of site-specific conditions is performed to determine the appropriate type of treatment system for each location. These systems are a part of permanent infrastructure and can be managed as stand-alone facilities or be integrated with centralized sewage treatment systems. They provide a range of treatment options from simple, passive treatment with soil dispersal, commonly referred to as septic or onsite systems, to more complex and mechanized approaches such as advanced treatment units that collect and treat waste from multiple buildings and discharge to either surface waters or the soil.

Decentralized wastewater treatment systems could be a feasible alternative for areas which are not connected to sewer networks as well as ones which are newly developed, so that the construction of their infrastructure is inadequate, not ready or would be executed in the future. Therefore, for local communities in the peripheries of urban development that exist outside the city center and rural areas where open drainage systems still exist. Over the past three decades, the city limits of Rewari have been continuously growing as evidenced by the satellite images of increasing urban infrastructure.

However, planning for sewage infrastructure and pipelines are a long-term investment, with the advent of exponential population increase also has been a challenge. Instead, decentralized wastewater management approach can be considered as a sustainable and cost-effective alternative as it treats discharges or reuses the effluent in the relative vicinity of its source of generation. Therefore, decentralization of wastewater treatment facilities is a feasible solution that may allow for localized treatment which may eventually be reused for secondary purposes. Like other systems, decentralized systems must be properly designed, maintained, and operated to provide optimum benefits.

6.5 Information Education and Communication

Through open exchange of information, education and communication established between the community and the implementing agency, ownership of the projects and interventions is reinstated; from inception to implementation and beyond. Selected committee members that form groups such as self-help groups, youth groups are in fact chosen to carry out regular capacity building of the community at large, with special attention paid to children, women and those belonging most vulnerable groups are carried out. Knowledge exchange and capacity building are at the core of IEC activities. The following image shows the various stakeholders involved in IEC Activities **(Figure 22).**

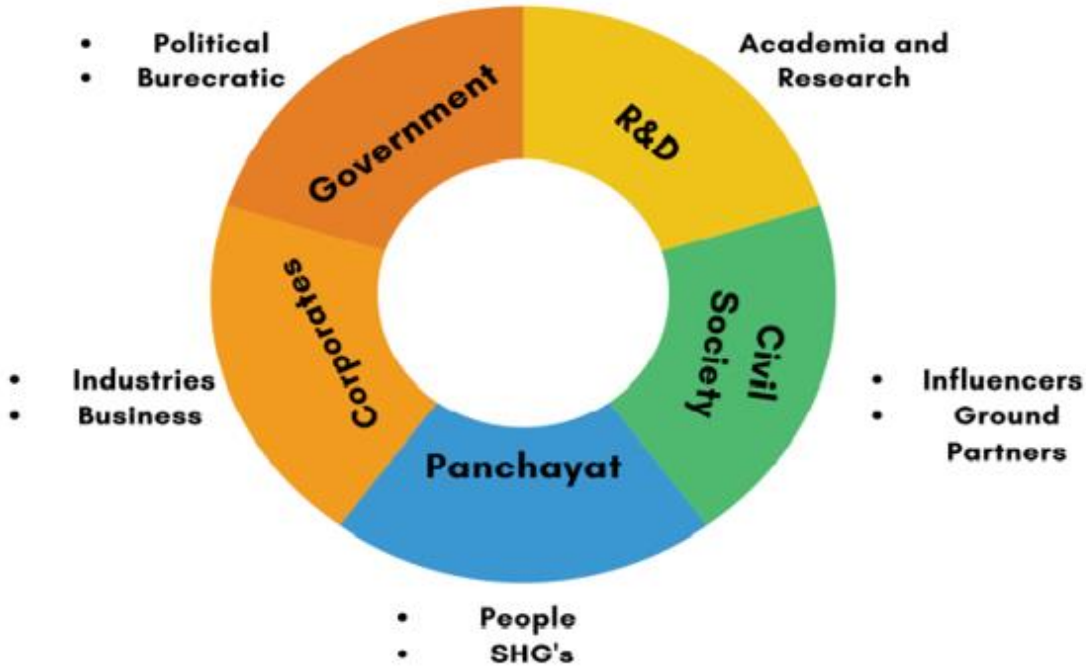


Figure 22 The above figure shows the various stakeholders of IEC Activities

7 Proposed Activity

7.1 Rainwater harvesting

Rain water harvesting primarily consists of the collection and storage of rainwater for subsequent use as source of water. The harvested water can be used for both potable and non-potable applications. There are many examples of rainwater harvesting systems which provide water for domestic, commercial, institutional and industrial purposes as well as agriculture, livestock, groundwater recharge, flood control, process water and as an emergency supply for firefighting. There are different criteria and techniques to select suitable sites for harvesting rainwater. In recent years, the analytical hierarchy process (AHP) and multi-influencing factors (MIF) are most widely used model for identification of rainwater harvesting sites. The AHP technique determines the weights of thematic layers and their rank to process identify the zones of rainwater harvesting sites. MIF analysis is an effective tool for water management because it is comparatively simple and reliable.

There are some factors that affect the rainfall water harvesting which needs to be focused for the development of suitable sites of water harvesting. These factors include rainfall, slope, soil texture, drainage, topography and land use / land cover and integration of these factors using weighted overlay analysis that results in suitable sites for rainwater harvesting. These sites are then classified into various suitability levels, namely, not suitable, less, medium, good and very good. The most suitable sites for rainfall water harvesting are shown in map (**Figure 23**). The block wise area proposed for rainwater harvesting under most suitable sites is shown in **Table 21.** For the process of calculating suitable site a fixed weightage is needed to be applies on the above-mentioned criteria (**Table 22).**

Table 21 Block wise area under very good suitable site proposed for rainwater harvesting

Block Name	**Area (Very Good suitability area in Sq. meter)**
Jind	15490110.7
Safidon	154520347.1
Julana	5239031.2
Pilukhera	43900821.8
Alewa	59608139.64
Uchana	3753762
Narwana	10697156.4
Total	293209369

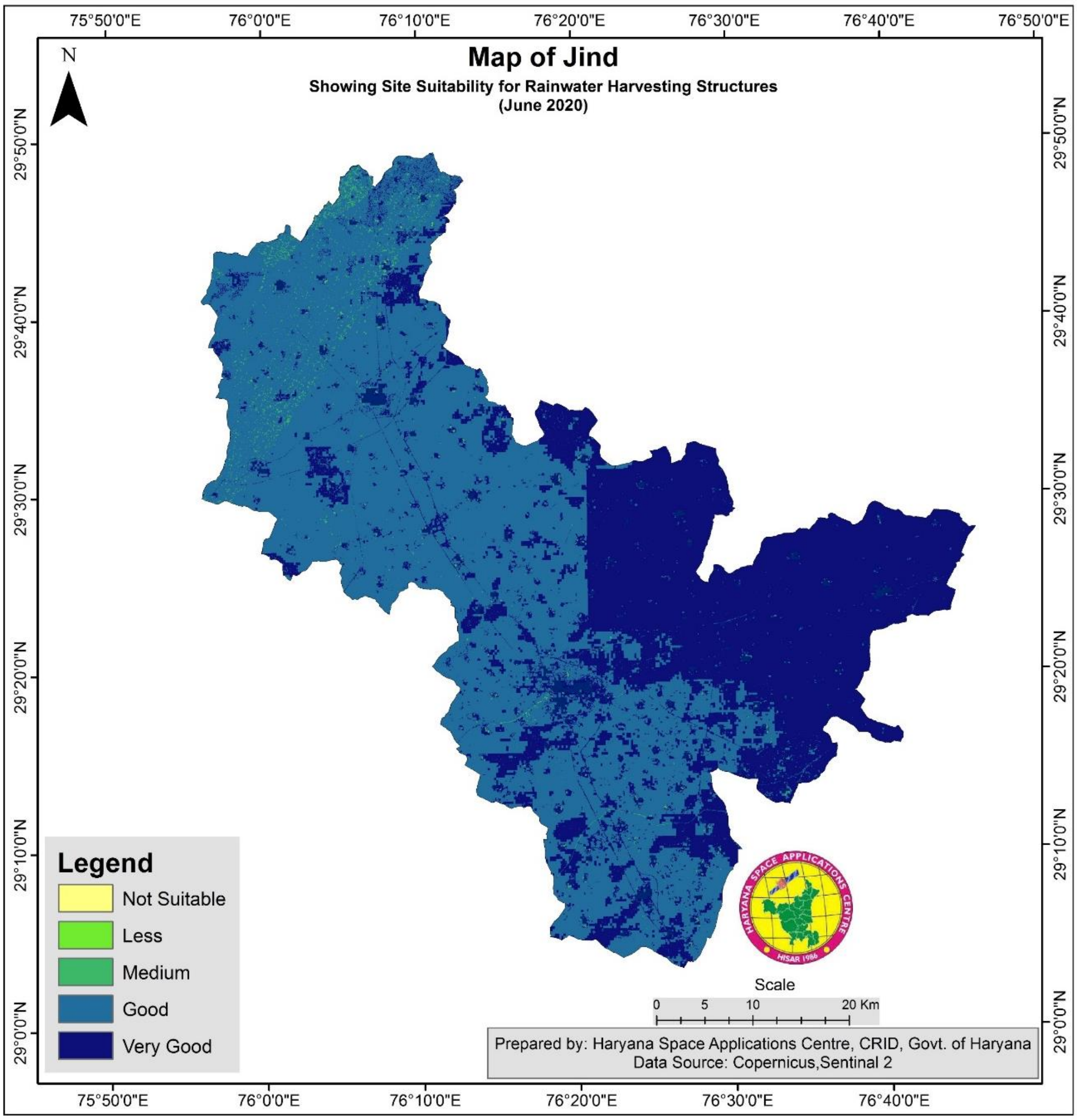


Figure 23 Site Suitability Map for Rainfall Harvesting Structure in the Year 2020

Table 22 Assigned Weight for criteria parameters

Parameters	**Weightage**
Rainfall	35
Slope	25
Drainage Density	5
Soil Texture	20
Lulc	15

7.3 Proposed Suitable Site based on Drainage

The drainages that are created from satellite imagery can be used as base for the water harvesting structure. Stream order system is a simple method of classifying stream segments based on the number of tributaries upstream. So, based on the order of streams we can propose the suitable sites for water harvesting structures. A general idea says that Mini percolation Tanks, on Ist order Stream, percolation Tanks, 2^{nd} Order Stream, Pakka check Dams 3^{rd} Order Stream, Micro Irrigation tanks 4^{th} Order can be built. **Figure 24** shows the proposed suitable sites based on drainage structure in Rewari district. Proposed harvesting structures in Rewari based on drainage **Table 23.**

Based on Drainage

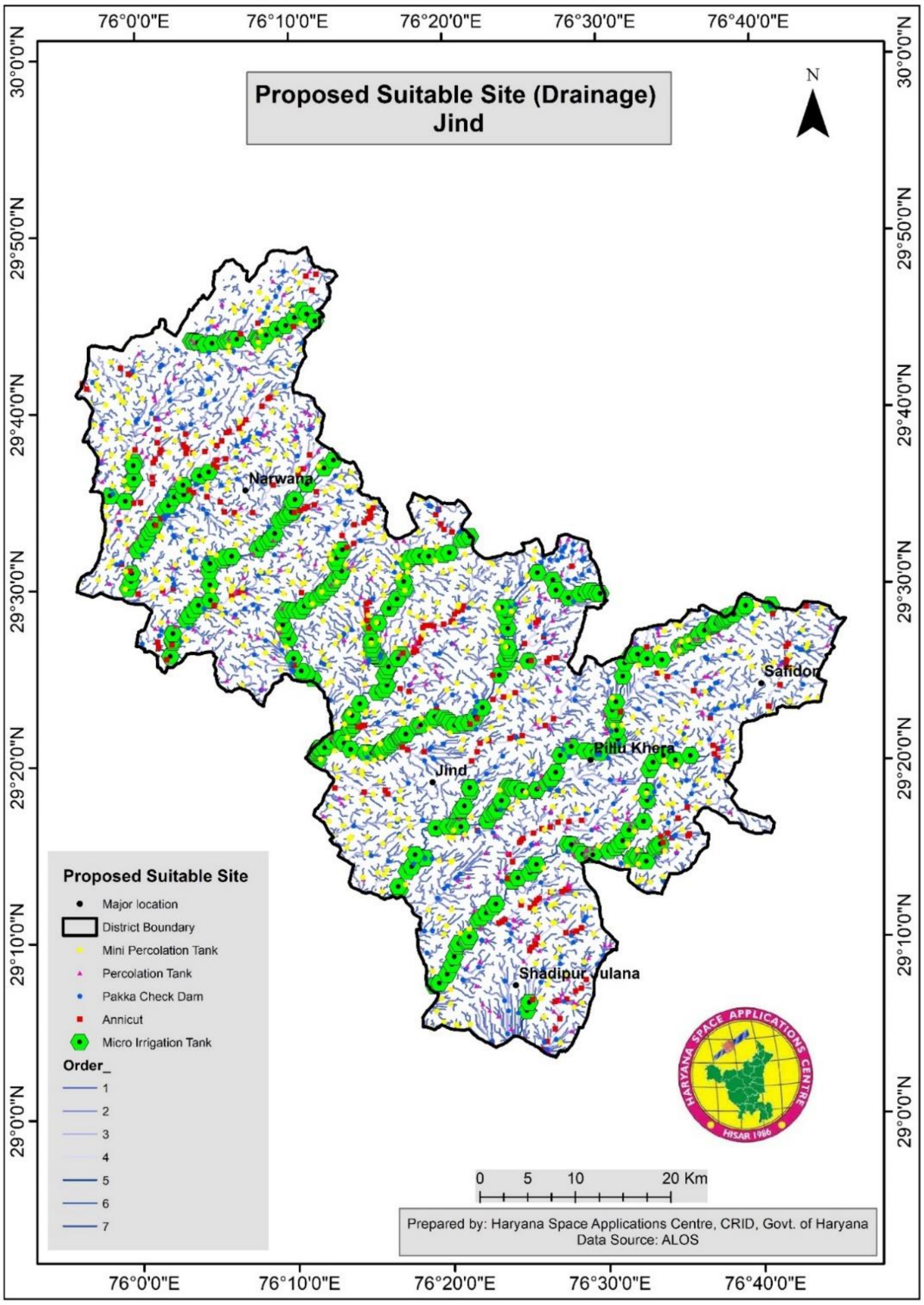


Figure 24 Proposed suitable sites based on drainage in Jind District

Table 23 Proposed harvesting structures in Jind based on drainage

Sr. No.	Block Name	Mini percolation Tank	Percolation Tank	Pakka Check Dam	Annicut	Micro Irrigation Tank
1	Jind	94	26	57	32	83
2	Safidon	58	25	46	20	25
3	Julana	48	43	42	38	22
4	Pilukhera	34	21	30	12	32
5	Alewa	37	18	34	24	27
6	Uchana	116	53	54	40	72
7	Narwana	130	59	95	67	53
	Total	**517**	**245**	**358**	**233**	**314**

Conclusion

The area of the district irrigated by the Sirsa branch is approx. 143744ha. Hansi branch enters in the district near Anta village in Safidon Tehsil with the augmentation of water supply fromBhakra canal. It irrigates the southern part of the Jind district through Buthra Branch and Sunder sub branch. The area irrigated by Hansi branch system is approx. 63326ha. Narwana Branch link canal irrigates some area of Jind district in its tail reaches. The district is so irrigated through Khanauri and Haripur minors. The area irrigated by these distributaries is approx. 5000 ha. (Source irrigation Dept. Canal). The district falls under the Agro Ecological Sub Region of Northern Plain &Central Highlands, and Agro-Climatic Region of Trans Gangetic Plain. The land is very plain with slope from North East to South and South Western direction.

Water being an ongoing reliable source around the world, it will not be available forever. When top energy consumers include the United States and China, along with environmental factors affecting these two regions, there is no doubt that this valuable resource will be limited on Earth. Water scarcity is no joke and shouldn't be taken lightly for it has great effects on food production, our farm lands, our health, and our economies. Droughts are common factors of this scarcity of water by drying up land and all the life contained in it. The land for crops is shrinking and are in need of more and more water everyday causing limited amounts of fruits and vegetables to be produced according to the research found by Daryanto and Gilis. When there is low food production, there come high demands which affect the economy.

Environmental concerns are not situated in one side of the world. Water is a broad source extending to different countries along with different advanced technologies. Irrigation has become widespread to improve farming and food production as well. Risks are taken into account because there may be cases in which misuse of conservation technology can affect our health and other resources other than water. Menses illustrates this situation well in his research regarding wastewater in the dairy industry. Through extended research, it is found that these happenings don't just occur once and in one place. The solution to prevent these occurrences exists in such initiatives of the government such as the JAL SHAKTI ABHIYAN. This is where collaboration is important among states and regions. To better and preserve our natural resources, actions and attitudes towards sustainability must stay at a high level throughout nation who is willing to work together towards the same goal.

………………………………………………. END…………………………………………………

“Jal Shakti Abhiyan: Catch The Rain”

WATER CONSERVATION
AND RAIN WATER HARVESTING

RENOVATION OF
TRADITIONAL WATER BODIES

REUSE AND RECHARGE
STRUCTURES

WATERSHED DEVELOPMENT

INTENSIVE AFFORESTATION

ENUMERATION OF WATER
BODIES

TRAINING / AWARENESS
PROGRAMS BY KVK

Catch The Rain
Where it falls, when it falls