



**GOVERNMENT OF INDIA  
CENTRAL GROUND WATER BOARD  
MINISTRY OF WATER RESOURCES**

***GROUND WATER INFORMATION BOOKLET  
OF  
DODA DISTRICT, JAMMU & KASHMIR***



***CENTRAL GROUND WATER BOARD  
NORTH WESTERN HIMALAYAN REGION  
JAMMU  
2014***

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## DODA DISTRICT AT A GLANCE

SL. NO	ITEMS	STATISTICS
1.	<b>GENERAL INFORMATION</b>	
	i) Geographical area (sq km)	11691
	ii) Administrative Divisions (2001)	
	• Number of Tehsil & Sub-tehsils	07
	• Number of CD Blocks	19
	• Number of Villages	654
	iii) Population (2001 Census)	
	• Total population	923926 persons
	• Population Density (pers/sq km)	79
	• Growth Rate	27.29
	• Sex Ratio	922
	iv) Average Annual Rainfall (mm)	926 mm
2.	<b>GEOMORPHOLOGY</b>	
	Major Physiographic units	<ul style="list-style-type: none"> <li>• Structural hills</li> <li>• Erosional hills</li> <li>• Plateau surface &amp; River Terraces</li> </ul>
	Altitude Range	700 – 7000 m amsl
	Major Drainages	
	• Chenab Basin	Chenab River, Marsoo Dhar, Chatroo, Kalnai, Neeru River, Warwand river Kagune Gad, Bilchari stream
3.	<b>LAND USE (2009-10) Hectt.</b>	
	• Forest area	219320
	• Net area sown	66252
	• Marsh of water logged land	93
4.	<b>MAJOR SOIL TYPES</b>	<ul style="list-style-type: none"> <li>• Podsols, Skelatal soil, alluvial soil, Talus and Scree</li> </ul>
5.	<b>IRRIGATION BY DIFFERENT SOURCES</b> (MI census 2005-06) (Ha)	
		<u>Area (Ha.)</u>
	Canals	5996
	Tanks	437
	Wells	52
	<u>Other Sources</u>	<u>485</u>
	Total	15016

SL. NO	ITEMS	STATISTICS
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.3.2012)	
	• No. of Dug Wells	Nil
	• No. of Piezometers	Nil
8.	PREDOMINANT GEOLOGICAL FORMATIONS	<ul style="list-style-type: none"> <li>• Quaternary Alluvium</li> <li>• Panjal Traps</li> <li>• Dogra slates</li> <li>• Salkhala formations</li> </ul>
9	GROUND WATER EXPLORATION BY CGWB (As on 31.12.2012)	
	• No of wells drilled	7 EW
	• Depth Range (m)	33.00 – 173.37
	• Discharge (lps)	1.27 lpm
	• Transmissivity (m <sup>2</sup> /day)	NA
10.	GROUND WATER QUALITY Presence of Chemical constituents more than permissible limits (eg. EC, F, As, Fe)	F is present more than permissible limits in pockets
11.	DYNAMIC GROUND WATER RESOURCES (2011) in MCM	
	• Annual Replenishable Ground Water Resources	5338.17 ham
	• Net Annual Ground Water Draft	1048.8 ham
	• Projected Demand for Domestic and industrial Uses up to 2025	1714.97 ham
	• Stage of Ground Water Development	19.51%
	• Total Fresh In-Storage Ground Water Resources	1000.05
	• Total Availability of Ground Water Resources	6338.22 ham
12.	AWARENESS AND TRAINING ACTIVITY Mass Awareness Programmes Water Management Training Program	01, Ramban, 2011 Nil.
13.	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	Nil
14.	GROUND WATER CONTROL AND REGULATION Number of OE Blocks No of Critical Blocks No of blocks notified	Nil Nil Nil
16.	MAJOR GROUND WATER PROBLEMS AND ISSUES	Presence of F more than permissible limits

# **GROUND WATER INFORMATION BOOKLET OF DODA DISTRICT, JAMMU & KASHMIR**

## **1.0 INTRODUCTION**

Doda district is the third largest district after Leh & Kargil extending over an area of 11,691 sq. km. The district comprised of 654 inhabited villages, 07 tehsils namely Banihal, Ramban, Doda, Bhaderwah, Kishtwar, Thathri and Gandoh. Out of these tehsils, Kishtwar is the largest tehsil having area of 1644 sq. km. The district has 19 blocks namely Marwah, Warwan, Kishtwar, Inderwal, Padder, Thathri, Banihal, Bhalessa, Bhaderwah, Doda (Ghat), Assar, Bhagwah, Ramban, Ramsoo, Marmat, Gundana, Chatroo, Drabshalla and Nagesni. Urban area consists of 06 NAC's namely Bhaderwah, Doda, Batote, Kishtwar, Ramban & Banihal.

Doda District is spread over an area of 11,691 sq. km. and as per 2011 census the population of the district is 409576 persons forming 12% area and 6.8% population of state respectively. The density of population as per said census is 79 persons per sq.km.

The Doda district lies within latitude 32°25'00'' and 34°14'00'' N and 75°00'' and 76°45'30'' E. The area is rugged and mountainous and falls under two important tehsils, Ramban and Kishtwar of Doda district. The Ramban township is located on the right bank of Chenab river, on the National Highway-1A and is about 155 km from Jammu, the nearest rail head Kishtwar is about 230 km from Jammu, on NH-1B on the left bank of Chenab river and the ancient town of Kishtwar is located on a plateau –the Kishtwar plateau. The bifurcation of NH-1A and NH-1B starts from Batote –a famous health resort about 120 km from Jammu and the both the highways run parallel to the course of the Chenab river one towards Ramban (NH-1A) and the other towards Kishtwar.

## **2.0 CLIMATE AND RAINFALL**

The climate of the area is not uniform due to wide variations in altitude from place to place. The area, in general, enjoys temperate to sub-tropical type of climate.

The climate of the district is almost dry. The rainfall is scanty. The temperature of the district varies from place to place. Ramban and Doda tehsils are fairly hot while as Padder, Marwah and Warwan remain snow bound for five-six months of the year. Summer is generally without rain and precipitation. The regions with elevations more than 1500 m above msl, experiences snowfall in the winter. The regions below 1000 m (amsl) during summer months viz. from April to July are quite hot, but the winters are pleasant.

The precipitation occurs either in the form of snowfall in higher regions and as rainfall in the lower regions. Monsoons prevail from July to September. Rainfall in the Doda district is heavy during July and September. The average annual rainfall is 926 mm and snowfall of about 135 mm.

### **3.0 GEOMORPHOLOGY AND SOILS**

The geomorphic forms recognized in the area are structural hills, erosional hills, plateaus, river terraces and hill slopes. Structural hills cover about 90% of the area and they belong to mainly Salkhalas, Dogra slates and Murees. The erosional hills have developed over Dul Quartzite and Gneissic outcrops. The plateau surface (Kishtwar plateau) forms a conspicuous geomorphic feature in the area. Present studies reveal that the plateau appears to be tectonic depression which, in the later phases of evolution supported a lacustrine domain over it. Sediments of the Chenab formation are, in general, fine to coarse textured and exhibit moderate to wide depression, presence of pollen and spores in Kishtwar formation indicate a temperate dry climate phases in the part.

The soil in the district is generally loose and sandy with very low moisture. The rate of soil erosion is very high and roads blockage is frequent during the rainy season.

Major part of Doda district comprises hill slopes of various gradients which are not conducive for development of soil profiles. Soils have therefore formed only on the gentle slopes of hills. Podsolis are the dominant group of soils in the area. The Deodar forested area of Batote mountains are underlain by the brown earth soils. In the glaciated northern and eastern parts of Doda district, skeletal soils have developed due to diverse climatic conditions. Localized wedges of alluvial soils are also present in the various valleys of the area. In the valley portion clay predominantly form the upper layer where as at higher altitude coarse grained soil exists. In the weathered horizons there are

also good soil mantles of few inches thickness to support the crop like wheat and maize. Talus and scree also proves good soil for such crops mostly in the slopes of mountains.

## **DRAINAGE**

The Chenab is the principal river of Doda district. It rises from the glaciated Dhauladhar range (the eastern part of Pir Panjal range) and flows in a regional direction of west or north-west draining in the entire Doda district. It generally follows the regional trend of the NW-SE, but at three places, namely Kishtwar, Ramban and Salal, the river makes southward swings and flows along the transverse direction. At these bends, the river is invariably joined by large southward flowing affluents which make the transverse valleys regionally extensive. A large number of tributary streams and nalas join the Chenab both from northern and southern sides in Doda district. The northern tributaries have generally large watersheds and longer courses than their southern counterparts. The Marusudar is the longest affluent river that flows from the north. Other large tributaries joining the Chenab from the northern sides are Helare, the Bhut, the Bichiane and the Ans. Important southern effluents are the Kullgad, the Kal Nal and the Niru.

Being mountainous country the Doda area has a high drainage density. Major rivers and glaciers follow the structural lineaments and form a parallel drainage pattern. Their tributaries exhibit sub-parallel pattern in the northern area of Doda district. Dendritic pattern is formed by the smaller nalas in the southern part of Doda district.

## **GEOLOGY**

Paddar formation of Early Proterozoic comprises high grade schists and granitoids, gneisses, Ramban formation consist of phyllite, slate, quartzose sandstone, diamictite and lenticular bands of limestone and gypsum and Bhadarwah formation of Late Proterozoic consists of slate, phyllite and quartzite. The Permian rocks in Singhpore area of Doda is represented by Nishatbagh formation and Triassic rocks in Desa and Warwan Valleys consist of black shale and sandstone. In Bhaderwah-Bhallesh basin shale, shaly limestone, massive limestone with shale partings and sandstone comprises the Triassic rocks. The Kaplas Batholith occupies an area of about 500 sq.km in part of Doda. It intrudes into Salkhala and Bhadarwah Slate formations.

## **Structure**

In Warwan valley, the N-S trending Kishtwar fault cuts off Kashmir-Tethyan basin, thereby juxtaposing it against Early Proterozoic rocks to its east. Bhaderwah-Chamba basin is folded into an asymmetric northwest-southeast trending synclinorium. In the southeast, the rocks of Bhadarwah formation are folded into a regional complementary anticline referred to as Kaplas anticline, the core of which is occupied by the batholith. Kishtwar Window exposes Dul Quartzite enveloped by Salkhala Formation, which is tectonically overlain by the high grade metamorphites along the trace of Main Central Thrust. Saldhar fault occurs in Badar-Ramban area, here Ramban formation overrides Gamir, Balia and Budhal slate formation.

## **4.0 GROUND WATER SCENARIO**

### **4.1 Hydrogeology**

Kishtwar plateau area comprises valley fill deposits, terraces and lacustrine (fluvio-glacial) deposits, surface morphology of the plateau terrain with uneven topography gives a concept of different phases of evolution in Quaternary era.

The Central Ground Water Board has drilled 7 exploratory tubewell in the district. Of these 7 EW's two drilled in 1972, were not the successful wells. Even the successful well of Kishtwar-II had meager discharge. In the year 2004, another well was drilled in Dugga that has yielded 227 litres of water per minute. In 2009, 4 exploratory tubewells were drilled in the district.

Ground water in the area occurs and manifests in the form of springs. Fracture porosity rather is an effective factor from point of view of occurrence of groundwater in the area. The occurrence and movement of groundwater in different aquifer is controlled by the structural features in addition to topography. Groundwater occurs in cracks, crevices and joints of these rocks. On the consideration of the facts mentioned earlier, it is felt that Kishtwar plateau area has groundwater potential. This particular source of water is not tapped to its full capacity, if it properly developed to the full extent. Hence this source alone is ample for water supply in the Kishtwar area. In Bhaderwah area the source of water supply is from khuls and canals. Surface flow in the area is perennial. In Doda area the source of water supply is from khuls. Ganapat spring is the only potential water supply in the Doda area. This source should be tapped for the Doda water supply and if this source is exploited to its full



capacity the existing water supply of this drought prone area will get further augmented. In Ramban area the source of water supply is mainly from Sarudah Nallah. Metra spring is the potential source of water supply in Ramban area.

### 4.3 Ground Water Quality

The ground water samples were collected during the Reappraisal Hydrogeological Surveys of the district and their analysis gives the overview of the ground water quality of the district. The range of chemical parameters in the district is summarized below.

General range of water quality parameters in the Doda district

Sl. No.	Water Quality Parameters	Spring		Deeper aquifer	
		Min	Max	Min	Max
1.	pH	6.92 Kunda pani	7.95 Nal spring	7.05 Rishipura	8.60 Dharmund
2.	Electrical conductivity $\mu\text{mhos/cm}$ at $25^{\circ}\text{C}$	100 Shatani nalla	3100 Tatapani	150 Bhalra	1980 Kanga
3.	Carbonate (mg/l)	00	00	00	48 Barthal
4.	Bi carbonate (mg/l)	43 Shatani nalla	628 Satinatar	67 Bhalra	1037 Kanga
5.	Chloride(mg/l)	3.50 Chaker nalla	39 Singwasi	3.5 Ircon	220 Premnagar
6.	Nitrate(mg/l)	0.01 Galehar	80 Ramban	0.10 Naikpora	139 Premnagar
7.	Fluoride(mg/l)	0.04 Kabi	3.00 Karol	Tracea Batote	4.90 Kanga
8.	Sulphate(mg/l)	Traces Nal spting	1350 Tatapani	01 Bridaban	475 Mager kot
9.	Calcium(mg/l)	08 Satinatar	513 Tata pani	04 Barthal	166 Seri
10.	Magnesium(mg/l)	2.4 Zinhal	150 Satinatar	2.4 Kanga	90 Magerkot
11.	Sodium(mg/l)	1.5 Shatani nalla	174 Tata pani	3.7 Suri kund	490 Kanga
12.	Potassium(mg/l)	0.2 Baman hal	12 Karala	0.5 Lamber	15 Dharmund-II
13.	Total Hardness as $\text{CaCO}_3$ (mg/l)	50 Shatani nalla	1296 Tata pani	20 Dharmund-II	700 Seri
14.	Iron(mg/l)	Traces Dagsol	1.70 Safa pani	0.37 Nachlana	6.5 Ladaval mode

From chemical quality point of view, ground water in the area is generally fresh and potable except for fluoride and iron concentration in few patches.

## **Fluoride**

Fluoride is an important water quality parameter for accessing the water quality for drinking purpose. In spring water, it ranges from 0.04 mg/l (Kabi) to 3.00 mg/l (Karol). Ground water of deeper aquifer is having maximum concentration 4.90 mg/l (Kanga), minimum concentration of fluoride in traces is noticed in the sample collected from Batote. About 22.7% of the samples collected from deeper aquifer are having fluoride concentration more than the maximum permissible limit (1.5 mg/l) for drinking purposes (BIS). In spring water majority of samples are having fluoride concentration within the maximum permissible limit of BIS for drinking water purpose except at two locations where 3.0 mg/l and 2.20 mg/l fluoride concentration are noticed in the water samples collected from Kanga and Tatapani.

## **Iron**

In the water samples collected from springs and deeper aquifer, concentration of iron ranges from Traces to 1.70 mg/l and 0.37 mg/l to 6.5 mg/l respectively. About 25% (11 out of 44 numbers) of samples collected from Deep ground water aquifer are exceeding the maximum permissible limits (1.0 mg/l) for drinking water purpose. Maximum concentration 6.5 mg/l is recorded in the water sample collected from Ladaval mode of deeper aquifer. In spring water only one sample location at safapani spring is having iron concentration 1.70 mg/l more than the prescribed limit of BIS.

## **4.4 Status of Ground Water Development**

The dynamic ground water resources of Doda have been estimated for valley areas (7191 ha) during the year 2009. In Doda district the total annual ground water recharge is 5931.30 ham of which recharge from rainfall during monsoon season is 2153.41 ha m and during non monsoon season is 493.19 ha m of which the recharge from other sources during monsoon season is 2907.90 ha m and during non monsoon season is 376.80 ha m. The total ground water recharge is worked out for all districts is 5931.30 ha m. The total ground water draft for domestic & industrial use 1003.20 ha m whereas for irrigation use is 6.00 ha m. The total ground water draft for all uses is of order of 1009.20 ha m. The allocation for domestic and industrial purpose is computed by projecting the existing ground water draft for domestic and industrial use for the year 2025 using population growth rate. Allocation for Domestic and Industrial requirement supply for 2025 is 1029.60 ha m and Net Ground Water Availability for future Irrigation Development is 4302.57 ha m. The overall stage of ground water development of the district is 18.90 % and fall in safe category.

## 5.0 GROUND WATER MANAGEMENT STRATEGY

### 5.1 Ground Water Development

In Bhaderwah and Doda area the source of water supply is from khuls and canals. Surface flow in the area is perennial. Ganapat spring is the only potential water supply in the Doda area. This source should be tapped for the Doda water supply and if this source is exploited to its full capacity the existing water supply of this drought prone area will get further augmented. In Ramban area the source of water supply is mainly from Sarudah Nallah. Metra spring is the potential source of water supply in Ramban area.

### 5.2 Water Conservation and Artificial Recharge

As per the district wise recharge plan prepared by CGWB, following types and number of structures were proposed in the district.

**Recharge Plan for Doda district**

S. No.	Details of project	No. of structures
1.	Construction and Development of ponds/tanks	10
2.	Gabion structures/ Checkdams/ Underground Bandharas	20
3.	Rain Water Harvesting and Artificial Recharge Structures	50
4.	Diversion of flows from Perennial Nalas/Springs in RCC storage tanks in Terrace farming areas	15
	<b>Total</b>	95

## 6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

The main source of water supply in the area is from nallahs and springs. Generally these sources are free from pollution because of hilly terrain. But the groundwater in some areas is being affected by fluoride and iron. In Ghat area, the fluoride content is above permissible limits as per the standards set up by BIS. In Bhaderwah area the groundwater contains more iron than permissible limits. The water samples in the area are collected from handpumps.

## 7.0 AWARENESS AND TRAINING ACTIVITY

Central Ground Water Board (CGWB), North Western Himalayan Region, Jammu, organized a **Mass Awareness Program** on “**Spring Protection & Snow Melt Conservation**” at Bhatti-Matterian, Ramban, District: Ramban on 10<sup>th</sup> March, 2012, which also included a **Jal Yatra and Painting Competition** on ‘**Conserve Water**’.

A total of 75 students from various schools in & around village Matterian and Ramban participated in the **Painting Competition on 'Conserve Water'**. The best paintings depicting the messages on 'ways & means to conserve water' were given 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> prizes and 5 encouragement prizes were also given.

A group of around 165 people comprising of 100 students, teachers and local people took part in the 'Jal Yatra'. The Jal Yatra was flaged off by Shri Vinod Soni, Chief Education Officer, Ramban. The Jal Yatra originated from the School, passed through the village lanes, bus stand, local market and culminated at School. The Jal Yatra was also accompanied by a Joker with 'Save Water' message on its cloth. The students were holding the placards with catchy slogans on Save Water, Rain Water Harvesting, Reduce-Reuse-Recycle Water etc.

Around 110 local people consisting of Gujjar and Bakerwal community attended the mass awareness program.

## **8.0 AREAS NOTIFIED BY CGWA/SGWA**

No area or block has been notified for ground water development.

## **9.0 RECOMMENDATIONS**

The Doda district covers an area of 11691 sq. km. in mountainous terrain out of which 8691 sq. km. falls under 2500 metres above mean sea level and is not considered feasible for geophysical surveys. The remaining 3000 sq. km. was covered under systematic hydrogeological survey by GSI before the year 1971. About 500 sq. km. area out of this was considered feasible for groundwater development

Kishtwar plateau area comprises valley fill deposits, terraces and lacustrine (fluvio-glacial) deposits, surface morphology of the plateau terrain with uneven topography gives a concept of different phases of evolution in Quaternary era.

Ground water in the area occurs and manifests in the form of springs. Fracture porosity is effective factor for occurrence of groundwater in the area. The occurrence and movement of groundwater in different aquifer is controlled by the structural features in addition to topography. Groundwater occurs in cracks, crevices and joints of these rocks. The Kishtwar plateau area has groundwater

potentialities. However the results of exploratory drilling at two closely locations in the plateau area were discouraging. It is probable that the high level springs are not tapping the entire flow in the vicinity.

- ◆ In the Kishtwar area, Gurdesh Nag which is a substantial source of water supply which, needs further development.
- ◆ In Bhderwah area the source of water supply is from khuls and canals. Surface flow in the area is perennial.
- ◆ In Doda area the source of water supply is from khuls. Ganapat spring is the only potential water supply in the Doda area and if this source is exploited to its full capacity the existing water supply of this drought prone area will get further augmented.
- ◆ In Ramban area the source of water supply is mainly from Sarudah Nallah. Metra spring is the potential source of water supply in Ramban area.



Jal Yatra during Mass Awareness Program at Ramban

Painting Competition on Water Conservation during Mass Awareness Program at Ramban



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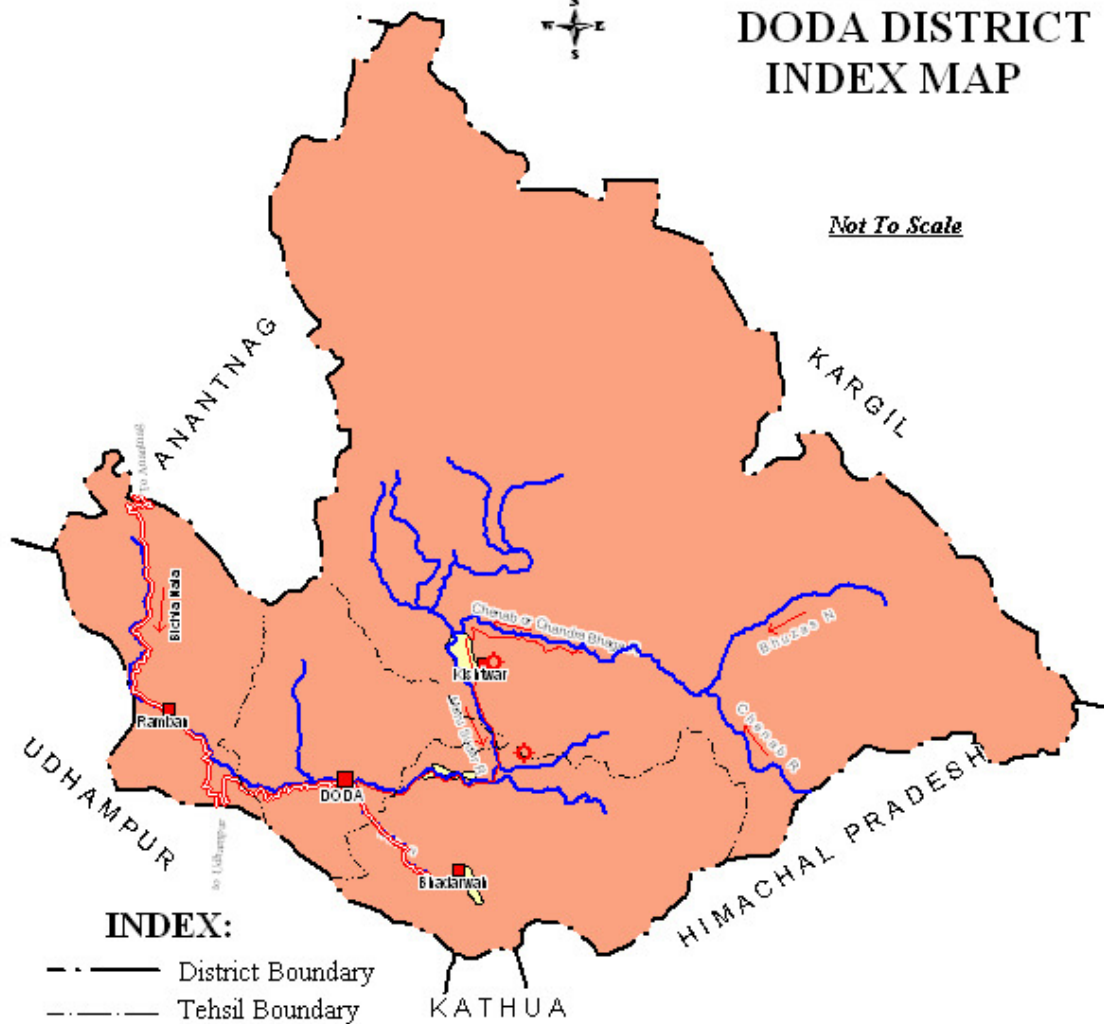


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Mass Awareness Program at Ramban

**Jammu & Kashmir**  
**DODA DISTRICT**  
**INDEX MAP**

*Not To Scale*



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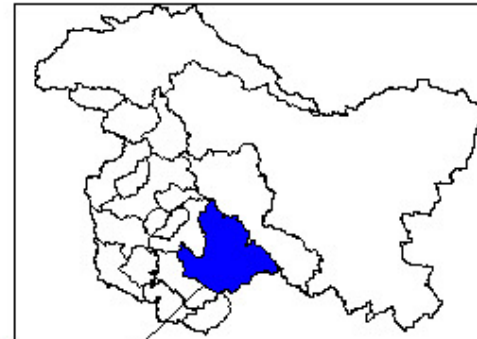






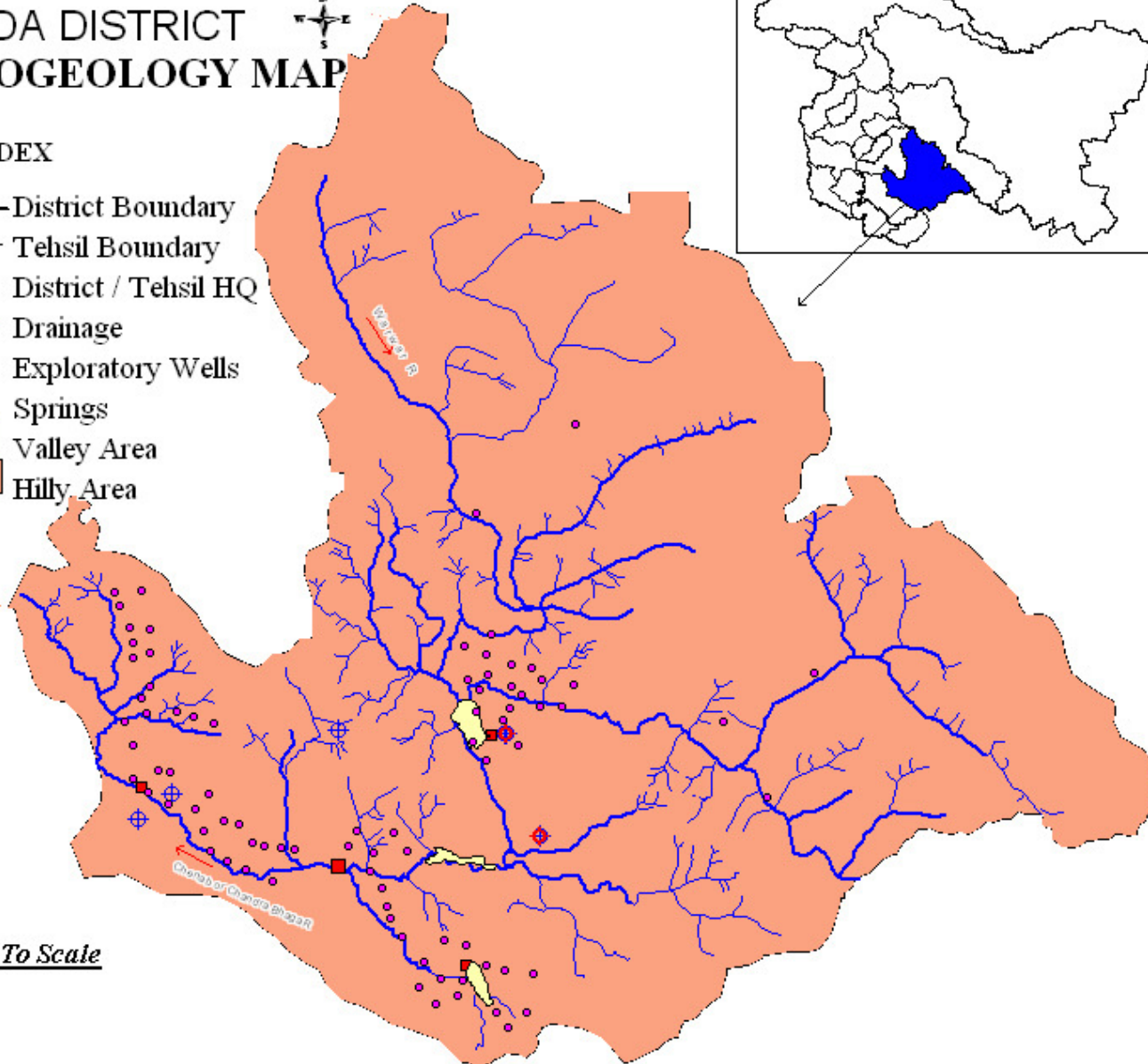
# ***Jammu & Kashmir***

## **DODA DISTRICT HYDROGEOLOGY MAP**



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- Hilly Area



*Not To Scale*

## CONTRIBUTORS

The ground Water Information Booklet of Doda district of J & K State has been prepared by Ms. Priya Kanwar, Assistant Hydrogeologist, North Western Himalayan Region, Jammu. The base of which was prepared by Sh. S. K. Mohanty, Assistant Hydrogeologist. This booklet has been scrutinized by Sh. N. R. Bhagat, Scientist 'D' & Head of Office, NWHR, Jammu.

The data generated in scientific studies carried out by various scientific officers and staff of NWHR, Jammu has been utilized in preparation of this booklet.



