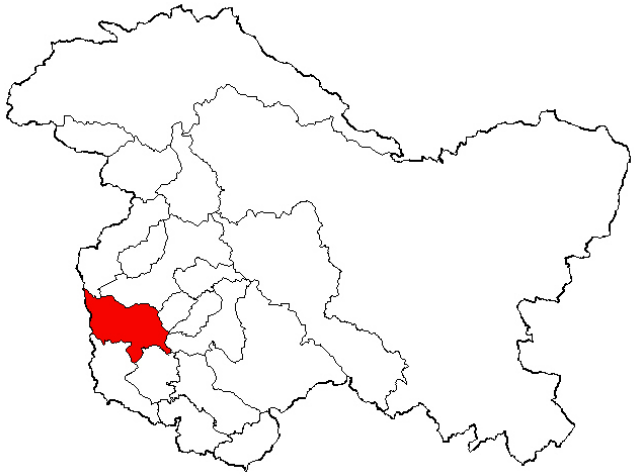
Government of India
Ministry of Water Resources
CENTRAL GROUND WATER BOARD

GROUND WATER INFORMATION BOOKLET
POONCH DISTRICT, JAMMU AND KASHMIR



NORTH WESTERN HIMALAYAN REGION
JAMMU
February 2009

GROUND WATER INFORMATION BOOKLET
POONCH DISTRICT, JAMMU AND KASHMIR

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POONCH DISTRICT AT A GLANCE

Sl. No	***ITEMS***	*Statistics*
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	1674
	ii) Administrative Divisions (2001)	
	• Number of Tehsil & Sub-tehsils	04
	• Number of CD Blocks	06
	• Number of Panchayats	115
	• Number of Villages	179
	iii) Population (2001 Census)	
	• Total population	3,72,613 persons
	• Population Density (per/sq km)	223
	• Rural & Urban Population	94 % & 6 %
	• SC & ST Population (in percent)	0.3 % & 40%
	• Sex Ratio	919
	iv) Average Annual Rainfall (mm)	1225 mm
2.	GEOMORPHOLOGY	
	Major Physiographic units	• High Hill Ranges • Denuded Hills • Valleys & Terraces
	Altitude Range	1000 to 4700 m AMSL
	Major Basin	Indus River
	Basin	Jhelum
	Sub-basin	Poonch River Mendhar River
3.	LAND USE (2006-07) Ha	
	• Forest area	34050
	• Cultivated Area	27711
	• Net area sown	27144
4.	MAJOR SOIL TYPES	• Mountainous Soil • Sub-Mountainous Soil
6.	IRRIGATION BY DIFFERENT SOURCES (MI census 2001-02) (ha)	

	No/Scheme	*Area (ha)*
Canals	147	3126 ha
Dug wells & shallow TW	-	-
Tanks	19	10 ha

7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB	Nil
8.	PREDOMINANT GEOLOGICAL FORMATIONS	
	Quaternary	• alluvium, valley-fills etc.

	Tertiary	• Murree, Siwallik
	Palaeozoic	• Panjal traps, meta-sediments
	Pre-Cambrian	• Salkhalas, Dogra slates
9.	HYDROGEOLOGY	
	Major Water Bearing Formations	
	1. Consolidated sediments / Hard Rocks (Older crystalline & Volcanics)	
	• Yield prospects	< 4 lps
	• GW structures	Hand pumps and Springs
	2. Semi consolidated sediments (Siwalik & Murree Group)	
	• Yield prospects	Low (<2 lps)
	• GW structures	Hand Pumps and Springs
	3. Unconsolidated/ porous sediments (Alluvium)	
	• Yield prospects	Low to moderate (0.33-3 lps)
	• GW structures	Hand pumps, springs
	Avg. depth to water level	19.00 m bgl to 24.39 m bgl
10	GROUND WATER EXPLORATION BY CGWB (As on 31.3.2008)	
	• No of wells drilled	Ew-02
	• Depth Range (m)	12.00 & 16.50 Both abandoned.
11.	GROUND WATER QUALITY Presence of Chemical constituents more than permissible limits (eg. EC, F, As, Fe)	Nil
12.	DYNAMIC GROUND WATER RESOURCES (2004) in MCM	Hilly; Not estimated
13.	MASS AWARENESS AND TRAINING ACTIVITY	Nil
14.	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	Nil
15.	GROUND WATER CONTROL AND REGULATION	
	Number of OE Blocks	Nil
	No of Critical Blocks	Nil
	No of blocks notified	Nil
16.	MAJOR GROUND WATER PROBLEMS AND ISSUES	
	Hydrogeological data limited	
	Terrain hilly and mountainous	
	Scope of spring development	
	Limited scope of GW development in valleys	

GROUND WATER INFORMATION BOOKLET
PUNCH DISTRICT, JAMMU AND KASHMIR

1.0 INTRODUCTION

Punch is one of the hilly border districts of Jammu province and is situated in the western part of the State. The Punch district is entirely hilly except few small fertile valleys in between. The district lies between 33°25' to 34º01' north latitude and 73°58' to 74º35' east longitude and is covered by Survey of India degree sheet no 43K. It is surrounded by districts of Kashmir province (Baramula, Badgam, Pulwama and Anantnag Districts) in the north & north-east, Rajouri district in the south and share the border with Pakistan Occupied Kashmir (POK) in the west, western half of the district is occupied territory.

The district has a total geographical area of 1,674 sq km (excluding occupied area) and covers 1.65% of State area. The district has 179 villages, of which 172 villages are inhabited and 07 uninhabited villages and has one town. The district has been divided into 4 Tehsils [Haveli, Mandi, Mendhar, Surankote] and 6 CD Blocks viz., Punch, Mandi, Mendhar, Balakote, Surankote, Buffiliaz.

As per 2001 census, the district has a population of 3,72,613 persons with 223 person per sq km density of population. Population wise it ranks twelfth in the State. The male and female population in the district is 194213 and 178400 respectively with a male/female sex ratio of 919. The schedule cast population in the district is 0.3% and the schedule tribe population is 40 %. Rural population is 94% of the total population. Literacy rate is 51%.

The major sources of irrigation are small water channels or the *Kuhls* in the district and an area of 3126 ha is brought under minor irrigation by various sources like canals, tanks and other sources. A sizeable part of the cultivated area of the district is not having the assured irrigation facilities and the agriculturists have to depend on the vagaries of weather. Maize, Wheat and Paddy are the principal crop of the district. Maize is harvested in Kharif season, where as wheat in Rabi season.

Under ground water exploration Central Ground Water Board has drilled two exploratory wells in Punch town with depth of 12.00 & 16.50 m bgl. Both EW were abandoned due to hard boulders. The state government had, however, constructed shallow bore wells, hand pumps in the depth range from 28.00 m to 103 m bgl where depth to water level ranges from 9.00 to 85.36 m bgl in Surankote and Punch respectively.

2.0 CLIMATE & RAINFALL

The climate of the district is sub-tropical in the southern part and tends to be temperate on the northern part comprising hill tops. In the higher region, the climate remains cold through out the year.
Average minimum and maximum temperature in the district varies from -20° to 40°C. The temperature starts rising from third week of March and reaches maximum during the month of May. January is the coldest month.

The district receives precipitation in the form of rainfall, mainly during the monsoon period from July to September. The average annual rainfall in the district is about 1225 mm with 56 to 73 average rainy days. Higher reaches of Pir Panjal receives snow fall in winter months.

3.0 GEOMORPHOLOGY AND SOIL TYPES

Physiography:
Punch district presents an intricate mosaic of mountain ranges, hills and valleys. It is primarily a hilly district with altitudes ranges from 1007 m near Punch town to 4700 m above mean sea level on high hill ranges towards north eastern part of the district. The entire district is traversed by the Siwalik hill ranges and the Pir Panjal range. The outer most Siwalik hill range exhibits a rugged and restive topography. The ranges show the steep northern slopes and gentle southern flanks. The Pir Panjal ranges sometimes branches off in irregular ridges that run oblique to the regional trend and the higher reaches of Pir Panjal ranges remain covered by snow.

Drainage:
Punch river, a tributary of river Jhelum, is the major drainage system in the district that rises from snow covered ranges. Punch river and its tributaries controls the drainage in major part (about 75 %) of the district. The general flow of the Punch river is westerly, the general trend of the river towards west obtained only after the confluence of Suran and Mandi river near Chandak, at Punch town another important tributary from the north, the Batar joints the Punch river. The Mendhar river drains about 25% of the district toward south – western part and joint the Punch river outside of the area.

Soils:
The high hill slopes of various gradients restrict the development of soil profiles, where as on gentle slopes of hills, mountainous soil are developed. Broadly two types of soils are present in the district with sub-mountainous soil toward southern part and Meadow soil over northern part. Localized wedges of alluvial soil are also present in the various valleys of the area.

4.0 GROUND WATER SCENARIO

4.1 Geology

The rock formations occupying the district range in age from Archean to Recent period. The generalized geological succession in the district is given below.

ERA	AGE	FORMATION	ROCK TYPE
Quaternary	Recent to Pleistocene	Alluvium	Terrace & moraine deposits & Sand.
Tertiary	Miocene to Pliocene	Siwalik	Boulder conglomerate clay stone, Massive grey or white sand stone with clay stone, Dark sandstone of shale.
	Lower Miocene	Murree series	Red or green shale with sandstone.
Palaeozoic	Carboniferous	Quartzite and Slates	Carbonaceous shale, Quartzite and Slate Granite and Gneisses
Precambrian	Alogonkian	Dogra Slates	Black and green Slate with Quartzite bands
	Archaean	Salkhala Series	Micaceous carbonaceous calcareous and graphitic schist slates phyllite and Biotite gneisses.

Hard formation forming hilly and mountainous terrain mainly comprises of low grade to high grade metamorphic and igneous rocks of pre-cambrian and Palaeozoic period viz., Panjal volcanics, granite, Dogra slate and Salkhala series respectively. It occupies the area in north eastern part. Murees formation occupies the western part of the area comprising mainly of red and purple shale. Alluvium, terrace deposits, fluvial deposits of Quaternary period occurs in the intermontane valleys, viz Punch valley, Mendhar valley etc, and constitute an important unit from ground water point view.

4.2 Hydrogeology:

Hydro-geologically, the district is divided into two distinct & well defined units viz., *porous formations* constituted by unconsolidated sediments and the *fissured formations* or hard rock formation constituted mainly by semi-consolidated to consolidated rocks units.

Ground water occurrence in fissured formation is mainly controlled by the existence of fissure in semi-consolidated and consolidated hard rocks existing in the district and is of sedimentary, metamorphic and igneous origin. The consolidated rocks form the high hill ranges with fracture and joints. In major part of the area, springs are the main ground water structures and have low to moderate yields. Existing fracture and joints form potential ground water zone. Ground water in these hilly areas issues in the form of springs and utilized for domestic and other purpose. Ground water also occurs in water table conditions over the terraces exist in consolidated formation. Shallow bore wells fitted with hand pumps have been constructed to develop ground water. The yield of these borehole ranges between 0.25 & 0.33 lps. Dug wells constructed over this terrace yielded substantial quantity of water to full fill domestic water needs.

Hot springs are also present on the contact between limestone and Subathu formation at Tahi area with temperature ranging from 82° to 87°C.

The unconsolidated sediments comprising of fluvial, channel deposits, valley fills, terrace deposits and alluvial fan constitute the porous aquifer in the district. These sediments consist of sand, gravel, cobbles, pebbles and boulders inter layered with clay beds. These sediments though limited in nature, form prolific aquifer. In Punch valley, Mendhar valley and Part of Suran and Mandi area these unconsolidated sediments forming aquifer are observed. In Punch valley ground water occurs in phreatic condition, the depth of shallow bore wells fitted with hand pumps ranges from 28.00 to 67.00 m bgl, where as depth to water level ranges from 12.19 to 24.39 m bgl. Bore wells fitted with hand pumps have been constructed over the terrace exist over the Siwaliks and Murree formation. Its depth ranges from 54.00 to 103 m bgl and depth to water level ranges from 24.00 to 85.36 m bgl respectively. The Murree formations are mainly argillaceous and thus form poor aquifers.

Central Ground Water Board had drilled two exploratory wells in Punch town with a depth of 12.00 m & 16.50 m bgl, both wells were abandoned due to the existence of boulders on the terrace of Punch valley.

4.3 Ground Water Quality

Ground water quality have been studied from the water samples collected from shallow ground water structure (hand pumps) in Punch valley and analysed for major constituents. The range of chemical parameters for shallow ground water aquifer is mentioned below.

S. No	***Parameter***		***Range***	
			Min	***Max***
1.	pH		7.33	7.46
2.	EC	µS/cm	493	620
3.	HCO_3	(mg/l)	317	342
4.	Cl	(mg/l)	11	25
5.	NO_3	(mg/l)	2.6	8.9
6.	F	(mg/l)	nd	0.11
7.	Ca	(mg/l)	70	104
8.	Mg	(mg/l)	5	19
9.	Na	(mg/l)	19	21
10.	K	(mg/l)	1.5	2.9
11.	TH as $CaCO_3$	(mg/l)	245	280

Ground water quality in the district is in general good both for irrigation and domestic purpose. From the samples collected from ground water sources viz., well, tube wells, hand pumps and springs, the EC in ground water is generally below 1000 µS/cm at 25°C.

Other chemical parameters are also within the permissible limits. Thus it can be concluded that the over all quality of ground water is good and suitable for domestic and irrigation use. However, there is need to have proper surveillance of ground water quality from different water sources to build up data base.

4.4 Status of Ground Water Development

Ground water development in the district is restricted to Punch valley, Mendhar valley and small valleys along the major streams and rivers. In these areas, drinking water supplies depend on the hand pumps and dug wells in addition to various water supply schemes based on springs, rivers / nallas.

Jammu & Kashmir state government had constructed hand pumps through Public Health Engineering departments in the district with the depth ranging from 28 to 103 m, depending upon the lithology of the area with a discharge varying from 0.25 lps to 0.33 lps were observed.

CGWB has so far explored the Punch area by drilled two numbers of exploratory wells in the district, in the depth range of 12.00 to 16.50 m bgl and other valleys are yet to be explored in this district.

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 Ground Water Development

The district being hilly & mountainous, traditional sources of ground water mainly springs has played a major role since past in providing assured irrigation and water supply. These include the nallas, springs, Chasmas, khatis. In some of the areas, at present too these are the only sources for the water of the settlements. However modern means for tapping the ground water have been employed in recent years. During the last few years, Irrigation and Public Health Department has constructed number of small depth bore wells fitted with hand pumps in these areas. The traditional water sources like springs and bowlies needs to be protected and

5.2 Water Conservation & Artificial Recharge

Ground water extraction through dug wells, hand pumps, bore-wells, *bowries* & the springs are the major sources of water supply to both rural and urban areas, but the availability of water during summer may be limited particularly in hilly uplands in drought years and requires immediate attention to augment this resource. Based upon the climatic conditions, topography, hydro-geology of the area, suitable structures for rain water harvesting can be planned. Roof top rainwater harvesting need to be adopted in hilly and urban areas and proper scientific intervention for spring development and revival is required in water scarce areas. In the hilly areas roof top rainwater harvesting

structures like storage tanks are recommended while in low hill ranges, check dam and roof top rainwater harvesting structures can be adopted.

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

The district being hilly and mountainous, most of the rainfall goes waste as runoff. This results in varying degree of recharge to the ground water. In such hard rock terrain, since the aquifers are discontinuous and of different geological/ hydrogeological setup, the ground water scenarios are different in various parts of the districts.

Most of the ground water issues and problems so far noted in the district are localized and need to be treated independently by taking micro level studies in a particular area. Some of the common issues are deeper water level in some of the areas as noticed in siwaliks, pollution of water sources due to unplanned disposal of garbage & lack of sewerage system; silt disposal in water courses in Punch valley also need to be studied for its effect on ground water. Hydrogeological data and information is very limited and there is need to take up ground water study once the law and order problem improves there.

7.0 AWARENESS & TRAINING ACTIVITY

Mass Awareness Programme (MAP) & Water Management Training Programme (WMTP) by CGWB

Mass Awareness as well as Water Management Training Programmers has not been carried out in this district by Central Ground Water Board.

8.0 AREAS NOTIFIED BY CGWA / SGWA

The ground water development in Punch district is on limited scale only and data available is not sufficient to quantify the availability of ground water resources.

9.0 RECOMMENDATIONS

- In valley areas, in addition to traditional ground water structures like dug wells & springs, shallow to medium depth bore wells can be constructed for developing the ground water resource.

- In hilly terrain, springs and perennial nallas are the major sources of water. Shallow to medium depth bore wells fitted with hand pump are useful ground water structures for meeting the domestic needs and are feasible at favorable areas.

- Traditional resources like springs need to be revived, developed & protected on scientific lines for various use.
- Small ponds/tanks/talavs can be utilized for augmenting water resources. The existing structures can be revived and renovated for harvesting water for use locally for the domestic needs.

- Roof top rainwater harvesting practices may be adopted in hilly areas since the district receives ample rainfall. Because of hilly terrain, maximum rainfall goes of as runoff, and a very small quantity contributes towards ground water replenishment.

- Rainwater harvesting in general & RTRWH in particular is an ideal solution for augmenting water resources particularly in sloppy hilly & chronic water scarce areas. There is thus need to create awareness for water conservation and augmentation and proper waste disposal for protecting water sources

- Mining of the riverbeds should be prohibited as it leads to fall in the water levels & it also damages the natural river system.

- People's participation is a must for any type of developmental activities. So they should be made aware for proper utilization and conservation of water resources available. In addition, micro level efforts are required for proper implementation of development programme.

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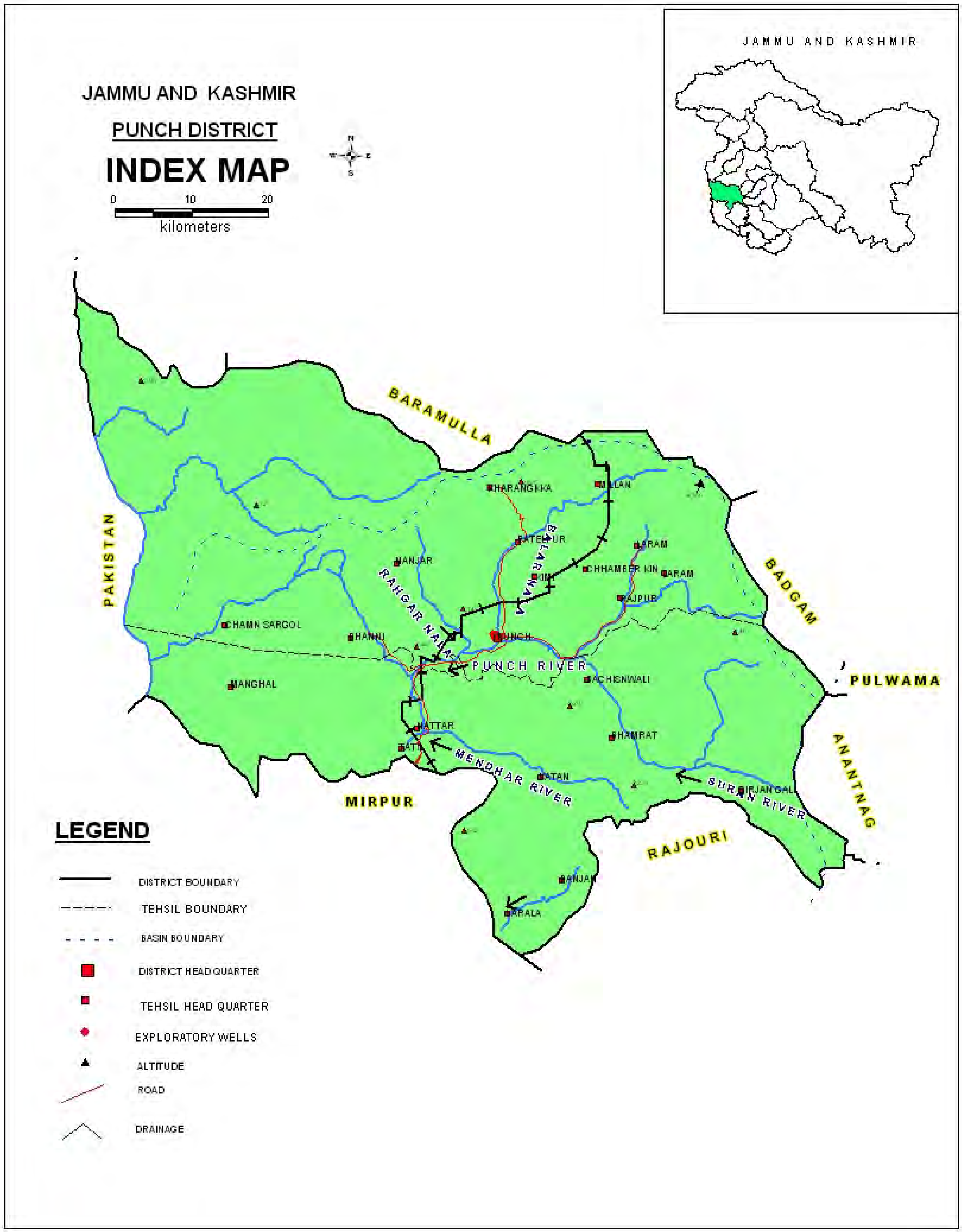
JAMMU AND KASHMIR
PUNCH DISTRICT
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BARAMULLA
BADGAM
PULWAMA
ANANTNAG
RAJOURI
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PAKISTAN
PUNCH RIVER
MENDHAR RIVER
SURAN RIVER
CHAMN SARGOL
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LEGEND
DISTRICT BOUNDARY
TEHSIL BOUNDARY
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EXPLORATORY WELLS
ALTITUDE
ROAD
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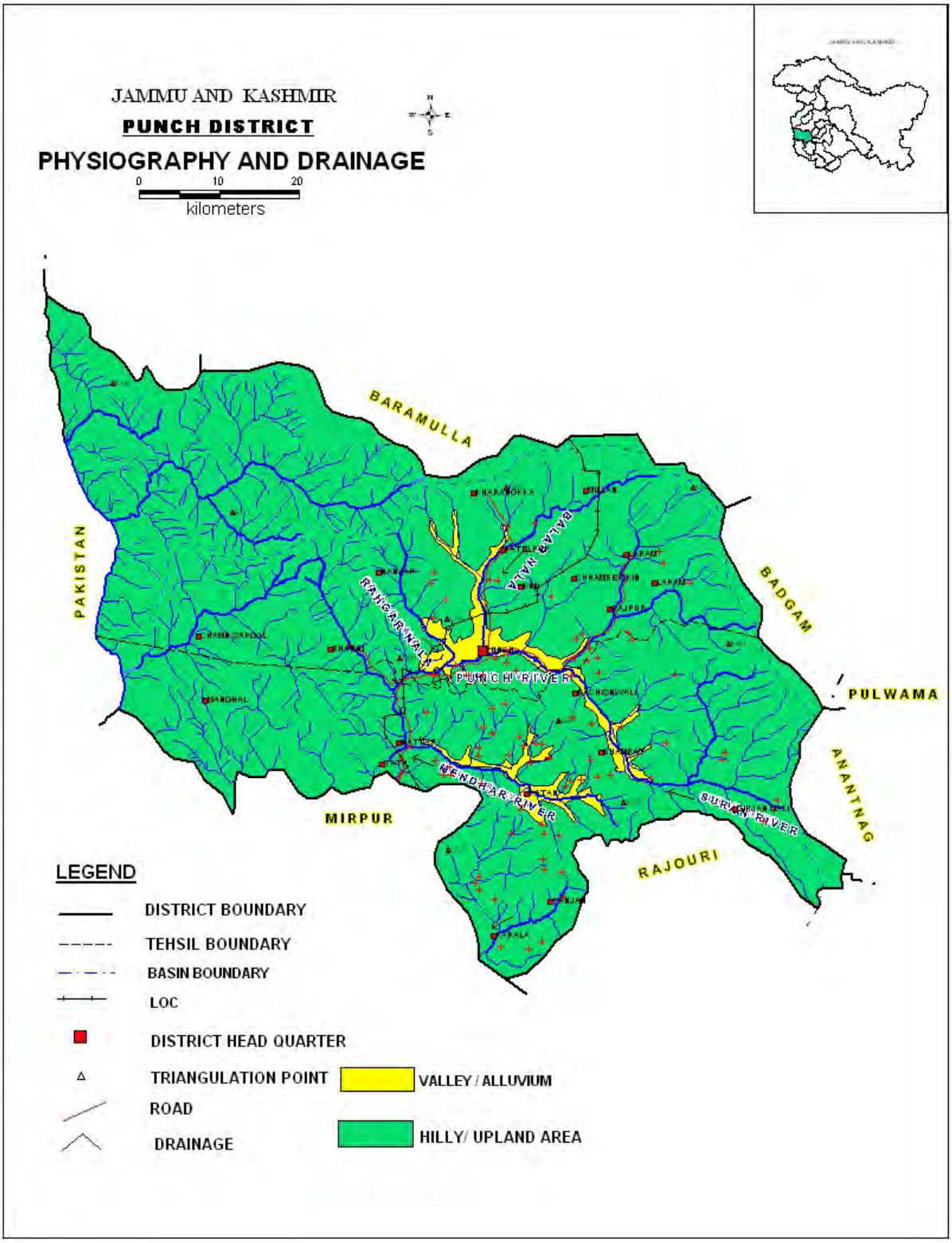
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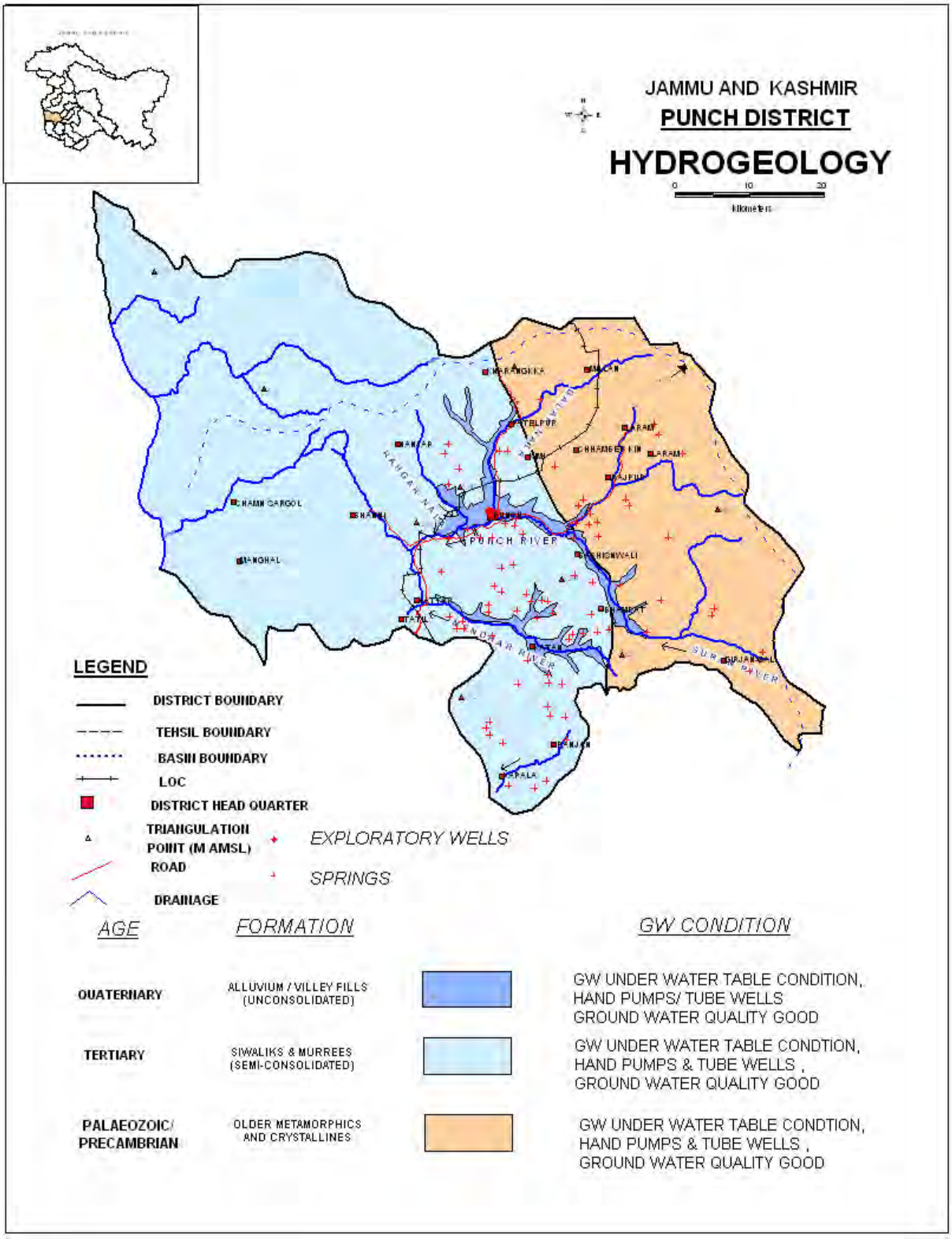
TEHSIL BOUNDARY
BASIN BOUNDARY
LOC
DISTRICT HEAD QUARTER
TRIANGULATION POINT
ROAD
DRAINAGE
VALLEY / ALLUVIUM
HILLY/ UPLAND AREA


JAMMU AND KASHMIR
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FORMATION
GW CONDITION
QUATERNARY
ALLUVIUM / VILLEY FILLS (UNCONSOLIDATED)
GW UNDER WATER TABLE CONDITION, HAND PUMPS/ TUBE WELLS GROUND WATER QUALITY GOOD
TERTIARY
SIWALIKS & MURREES (SEMI-CONSOLIDATED)
GW UNDER WATER TABLE CONDTION, HAND PUMPS & TUBE WELLS , GROUND WATER QUALITY GOOD
PALAEOZOIC/ PRECAMBRIAN
OLDER METAMORPHICS AND CRYSTALLINES
GW UNDER WATER TABLE CONDTION, HAND PUMPS & TUBE WELLS , GROUND WATER QUALITY GOOD

LEGEND

DISTRICT PUNCH

	Wells feasible	Rigs suitable	Depth of Well (m)	Discharge (lpm)	Suitable artificial Recharge structures
Soft rock aquifers	Tube well	Percussion, Rotary, DTH with Odex	Up to 80	2100-3600	Check dam, Check dam cum ground water dam, Recharge shaft/pit
	Dug well	Manual	10-20	300-600	
Hard rock aquifers	Tube well	DTH with Odex	Up to 40	750-1000	
	Dug well	Manual	10-20	300-500	
	Spring development			30-2000	

Major drainage

Spring

Thrust

Tehsil boundary

District boundary

International Boundary

OTHER INFORMATION

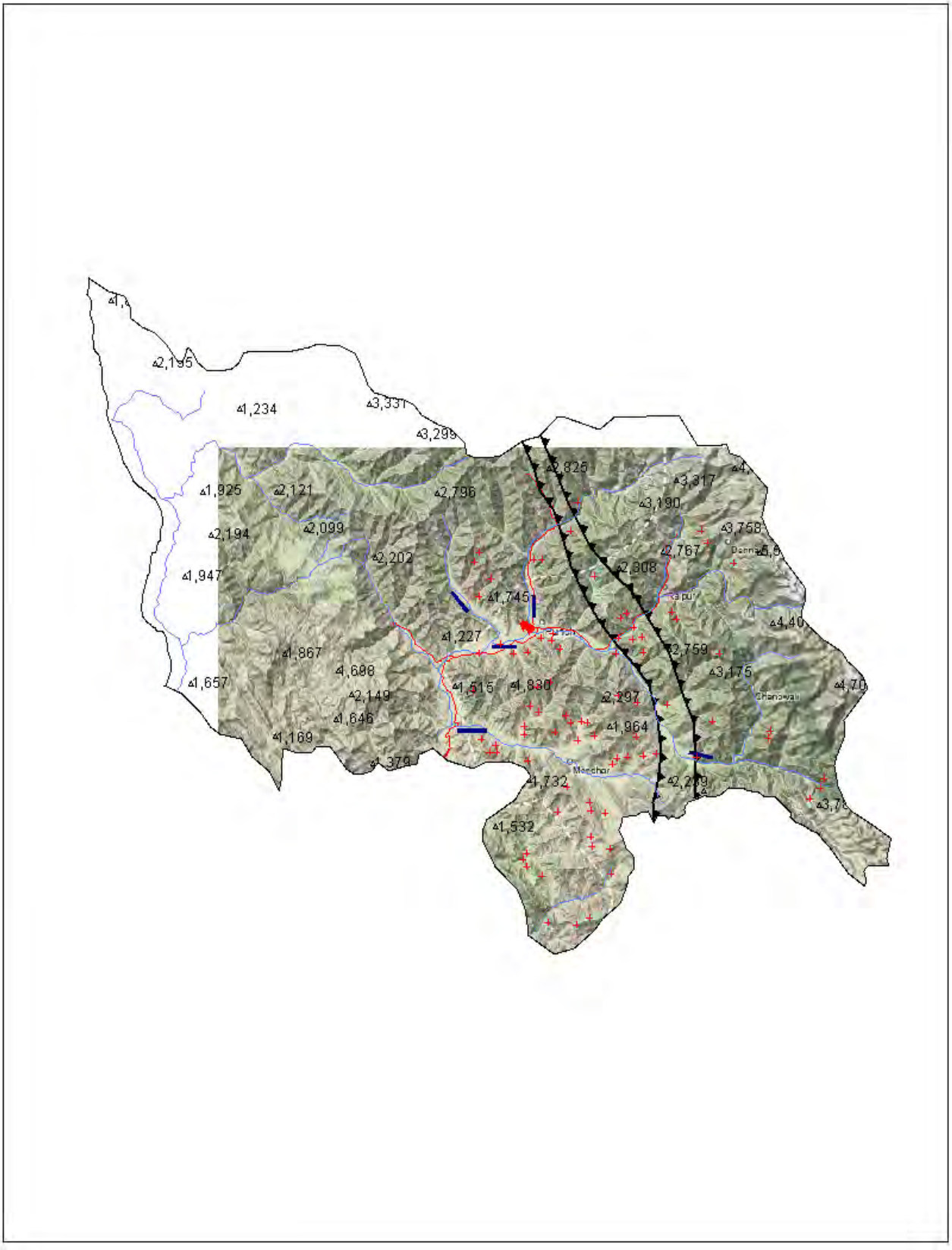
Total area	1658 sq.km (Excluding the area illegally occupied by Pakistan)
No. of Tehsils	2
Major drainage	Suran, Punch Rivers
Population	371561 (2001 Census)
Rainfall	1058 mm
Temperature	-4.9° C to 31.6° C
Regional geology	Alluvium, Murrees, Siwaliks, Panjal traps
Ground Water quality	EC <750 micro mhos/cm at 25^0C
Utilizable ground water resources	Not estimated
Stage of ground water development	Not estimated
Water shed/tehsil showing intensive ground water development	Nil

GROUND WATER INFORMATION BOOKLET OF POOCH DISTRICT, JAMMU & KASHMIR

CONTRIBUTORS

The ground water information booklet in respect of Pooch District of Jammu and Kashmir State has been compiled by Shri S. Santhana Subramani, Scientist-B under the supervision & guidance of Shri Arun Kumar, Regional Director, Central Ground Water Board, North Western Himalayan Region Jammu.

Various scientific officers and staff of the North Western Himalayan Region, Jammu have generated information and provided assistance in compiling the data and preparation of maps.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