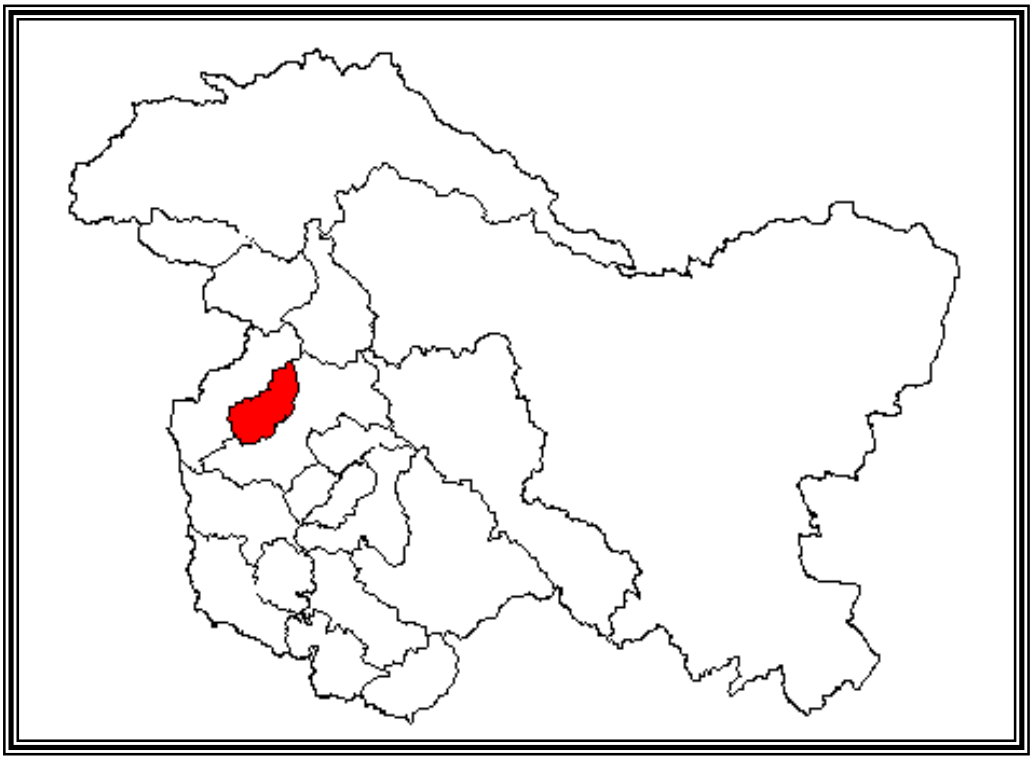
Government of India
Ministry of Water Resources

CENTRAL GROUND WATER BOARD

GROUND WATER INFORMATION BOOKLET

KUPWARA DISTRICT, JAMMU & KASHMIR



NORTH WESTERN HIMALAYAN REGION
JAMMU

March 2013

GROUND WATER INFORMATION BOOKLET

KUPWARA DISTRICT, JAMMU & KASHMIR

CONTENTS

KUPWARA DISTRICT AT A GLANCE

Sl. No.	ITEMS	STATISTICS
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	2379
	ii) Administrative Divisions (2001) • Number of Tehsil & Sub-tehsils • Number of CD Blocks • Number of Panchayats • Number of Villages	 3 11 234 370
	iii) Population (2001 Census) • Total population • Population Density (pers/sq km) • Muslim & others Population • Sex Ratio	 6,50,393 persons 237 97.37% & 2.63% 906
	iv) Average Annual Rainfall (mm)	869 mm
2.	GEOMORPHOLOGY	
	Major Physiographic units	• High Karewa Plateau lands • Sharp ridges of hard rock • Intervening valleys & River Terraces- Lolab valleys that is 6 Kms long and 4.4 kms wide is most important.
	Average Range	1635 m amsl
	Major Drainages • Kishan Ganga basin • Pohru river basin	 • Pohru river is the distributaries of Jhelum • Nanchar Nala drains Eastern part • Kahmil Nala drains Western part
3.	LAND USE (2009-10) sq.km (Source- Digest of Statistics 2009-10)	
	• Forest area • Net area irrigated • Net area sown	1703 228.04 456.51
4.	MAJOR SOIL TYPES	• Soils developed on Karewa tops and upland areas are medium to fine textured and known as Hapludalf • Soils found on plains are clay loam in nature and dark brown in colour Mountainous Soil • Sub-Mountainous Soil

Sl. No.	ITEMS	STATISTICS
6.	IRRIGATION BY DIFFERENT SOURCES (Source- Digest of Statistics 2009-10)	
	• Dug wells & shallow TW • Canals • Tanks • Others	*Area (sq km)* 8.30 184.74 16.62 18.38
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.12.20012) • Number of Dug Wells • Number of Piezometers	 10 Nil
8.	PREDOMINANT GEOLOGICAL FORMATIONS	• Quaternary Alluvium • Karewa formations • Panjal Traps • Dogra Slates • Zewan beds/ Gondawana formations
9.	HYDROGEOLOGY	
	Major Water Bearing Formations	
	1. Consolidated sediments / Hard rocks Panjal Traps, Dogra slates, Zewan beds, Gondawana formation)	Covering major part (65%)
	• Yield prospects • GW structures	Very Low (2-5 lps) Springs & Dugwell, Tube wells & Handpumps
	2. Unconsolidated layered formations- (Karewa formation- Both upper and lower Karewas)	Covering (50%)
	• Yield prospects • GW structures	Low to Moderate (5-10 lps) Handpumps, Dugwells & Tubewells
	3. Unconsolidated porous sediments (Alluvium)	Intermountain small valleys and main Kashmir valley area (35%)
	• Yield prospects • GW structures	Low to Moderate (10-20 lps) Handpumps, Dugwells & Tubewells
	Avg. Depth to water level • May • November	 3-4 m bgl 2-3 m bgl

Sl. No.	ITEMS	STATISTICS
11.	GROUND WATER QUALITY	
	Presence of Chemical constituents more than permissible limits (eg. EC, F, As, Fe	Fe is present more than permissible limits in pockets
12.	DYNAMIC GROUND WATER RESOURCES (2009) in MCM (valley area only)	
	• Annual Replenish able Ground Water Resources	189.70
	• Net Annual Ground Water Draft	44.72
	• Projected Demand for Domestic and industrial uses up to 2025	71.67
	• Stage of Ground Water Development	23.57%, Safe
13.	AWARENESS AND TRAINING ACTIVITY	
	• Mass Awareness Programmes	Nil
	• Water Management Training Programmes	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.	GROUND WATER PROBLEMS AND ISSUES	
	• Silt pollution	Presence of Gas & high Iron content are the main hazards
	• Depletion of water table	There is general decline in water levels which is very minor.
	• Water scarcity & Deep water levels	In higher hilly areas.
	• Water logging	In isolated pockets near rivers and lakes

GROUND WATER INFORMATION BOOKLET

KUPWARA DISTRICT, JAMMU & KASHMIR

1.0 INTRODUCTION

Kupwara district with its head quarters at Kupwara lies in the northern most part of Kashmir valley and is located between $34^0$16'00" and $34^0$50'00" North Latitude and between $73^0$45' and $75^0$20' East Longitude and is covered by SOI degree sheet No. 43 J. The district is bounded by Ladakh district in the north, Baramulla district in the south and east. The north-western part of the district is the line of actual control (L.O.C).

The district has a total geographical area of 2,379 sq km, comprising of 370 villages (362 in habited villages and 8 un-Inhabited villages). Administratively, the district is divided into 03 tehsils (Kupwara, Handwara, Karnah) and 11 Development blocks (Kupwara, Sogam, Trehgam, Kralpora, Ramhall, Rajwar, Langate, Thagdhar, Wawoora, Kalachrooch, Teetwal)

As per 2001 census, the district has a population of 6,50,393 persons with population density of 237 persons per sq. km. The male and female population in the district is 3,41,303 and 3,09,090 respectively with a male/female sex ratio of 906. The schedule caste population in the district is 75 persons i.e. 0.001% of the total population and Scheduled tribe population is 51,753 i.e. 8% of the total population. The district has recorded population growth of rate of 40.84% during the decade 1991-2001 as compared to 29.98% at state level.

The main sources of irrigation are canals and an area of 22804 hectares is brought under irrigation by various sources like canals, tanks, wells and other sources.

Central Ground Water Board has carried out extensive hydrogeological studies both by conventional and non-conventional methods in the district. Under Ground Water Exploration, 24 exploratory wells have been drilled ranging in depth from 50 mts to 405 mts. At present CGWB monitors 10 NHS only, where ground water levels data of 15 NHS, which were regularly monitored upto, the year 1989 is also available.

2.0 CLIMATE AND RAINFALL

The climate of the district is Temperate cum Mediterranean type. In the higher reaches the temperature remains cold through out the year. Average minimum and maximum temperature varies from –5°C to 32°C. The winter season starts from the middle of the November and severe winter conditions continues till the middle of February/March.

The District receives an average annual precipitation of about 869 mm in the form of rain and snow for about 60 days.

3.0 GEOMORPHOLOGY AND SOILS

Kupwara district is hilly and mountainous in the north, west and east regions comprising of Pir-Panjal ranges of Lesser Himalayas with broad intermountain valley. The altitudes of the hill ranges ranging from 2000 m to 3500 m amsl. Valley has flat to mildly undulating topography with its elevation about 1600 m amsl and has an area about 6000 sq km. The Master slope in the area is towards southeast.

The district forms part of the Jhelum and KishanGanga sub basin of Indus basin. River Jhelum is the major river in the valley area where as Kishanganga River in the northern part with several tributaries mainly drain the area. River Pohru, a tributary of the river Jhelum flows in the central part of the district. The Khamil nallah, Pohru Nallah and the Manchar Nallah are the important tributaries of the river Jhelum, which crisscross the area and join the river Jhelum.

Soil in hilly areas is poor and fertile in plain areas. Productivity in higher ranges is poor while in central regions is fertile.

4.0 GROUND WATER SCENARIO

4.1 GEOLOGY

The rock formations underlying the district ranges in age from Cambrian to Quaternary. The brief generalized geological succession in the district is given below

Stratigraphic Unit	*Litho logy*	*Thickness (m)*	*App. Age*
Alluvium	Clay, Silt and sand	15	Recent
Upper Karewa	Alternate greenish sandy and grey clay bed layers with calcareous Laminae	750	Plio-pliestocene
	Second fluvio-glacial boulder bed	130	
Lower Karewa	Clay (bluish grey) & Conglomerates with coarse to fine sand (greenish in colour) alternate with grey sandy clays. *Lignite and peat material*	2000	Plio- Pleistocene
	First fluvio-glacial Boulder bed	200	
Panjal Trap	Agglomeratic slates, grits and effusive rocks		Permo-Carboniferous
Zewan beds	Shale, slates with quartzite and limestone.		Cambro-Silurian

Hard formations forming hilly and mountainous terrain mainly comprises of igneous and metamorphic rocks belonging to the Panjal traps and Zewan beds. The Karewas and alluvium of Quaternary and Tertiary age (Plio-Pleistocene) underlie the valley area and consists of alternate bands of sand, silt, gravel & clay, interspersed at two to three levels locally by glacial boulder beds. This formation is important from ground water point of view and sustains the water supply system in the area. This formation of Plio-Pleistocene age lies dis-conformably over the older rocks ranging in age from Cambrian to Triassic.

4.2 HYDROGEOLOGY

Hydro-geologically, the district is divided into two distinct and well-defined aquifer systems, viz., hard rock or fissured aquifer constituted mainly by semi-consolidated to consolidated rock units and *soft sedimentary or porous aquifer* constituted mainly by unconsolidated sediments.

The fissured formation includes the semi-consolidated to consolidated rock formations exposed in the district are igneous, metamorphic and sedimentary origin. These forms low and high hill ranges through out the district. Fractured and jointed igneous, metamorphic rocks and the scree/talus deposits in the foothills form low to moderate potential aquifers with poor to moderate yields. Occurrence and movement of the ground water is mainly controlled by secondary porosity originated due to fracturing and faulting and related tectonic disturbances and weathering. Ground water oozes in the form of springs, seepages in the hilly areas and is utilizing for domestic purposes. There are numerous springs in the district generally concentrated along the contact zones and also in the hilly area. At some places shallow hand pumps and tube wells fitted for ground water development. The yield of the shallow tube wells and hand pumps constructed along these secondary porous zones varies from 3-35 m^3/hr.

The unconsolidated sediments comprising of fluvio-glacial and lacustrine deposits of Karewa formation and recent alluvium, terrace deposits and alluvial fan deposits constitute the porous aquifer system of the district. The sediments consist of sand, gravel, cobbles, pebbles, boulders interlayered with thick clay beds and form the prolific aquifer system. Occurrence and movement of ground water is mainly controlled by the primary inter-granular porosity in the soft sedimentary Quaternary alluvium and the Karewa formations. This unconsolidated sedimentary deposit forms multi-layer major aquifer system in the area. The sedimentary formation is +300m thick in the district as revealed by the study and ground water exploration carried out by CGWB. Ground water in the district occurs in phreatic and confined conditions in these formations. The depth of the exploratory wells ranges from 8.32 m at Dahgam to 403.50 m at Didukut. The water table occurs under artesian conditions at some areas. The yield of the tube wells ranges from 65 lpm at Hayatpora to 2700 lpm at Panditpora for drawdowns ranging from 20 m to 27 m respectively. The depth to water level ranges from 0.60 m agl (artesian free flowing) at Trehgam to 28.46 m at Chirkoot. The transmissivity values ranges from 63 m^2/day to 100 m^2/ day.

4.3 DEPTH TO WATER LEVEL

The water level from the national network of hydrograph stations (15 no) set up in the valley area of the district is available up to year 1989. A perusal of the data shows that in major part of the valley area the depth to water levels are shallow, less than 5 m bgl. The depth to water level however, ranges from 0.45 at Sogam to 7.91 m bgl at Cherakut. In valley areas, open wells and tube wells are the main ground water withdrawal structures.

4.4 GROUND WATER RESOURCES:

Precipitation in the form of rain and snow in the district is the major source of ground water recharge apart from the influent seepage from the perennial rivers, streams and lakes, irrigated fields and inflow from upland areas. Discharge of ground water mainly takes place from wells, tube wells and effluent seepages of ground water in the form of springs and base flow in streams.
The Ground Water Resources for the district were computed in the year 2009, as per the GEC-1997 methodology and are given below

1	Total Geographical Area	MCM	2379
2	Valley Area	MCM	6,00
3	Net Ground Water Availability	MCM	189.70
4	Ground water Draft For Irrigation	MCM	0.24
5	Allocation For Domestic & Industrial Use up to 2025	MCM	71.67
6	Stage of Ground Water Development	%	23.57

The stage of ground water development in the valley portions of the district is less than 25% and falls in the safe category. Thus, there is scope for further ground water development.

4.5 GROUND WATER QUALITY

CGWB monitors the quality of ground water of shallow aquifers through National Hydrograph Network Stations. In addition to these, water samples are collected during the scientific studies whenever taken up. The range of chemical parameters in the district is summarized below.

S.No	Parameter		Range	
			Min	Max
1	pH		7.1	8.2
2	EC	µS/cm	97	1580
3	HCO_3	mg/l	49	708
4	Cl	mg/l	05	199
5	NO_3	mg/l	Trace	92
6	F	mg/l	Trace	0.57
7	Ca	mg/l	12	174
8	Mg	mg/l	03	79
9	Na	mg/l	02	69
10	K	mg/l	Trace	39
11	TH as $CaCO_3$	mg/l	42	760

From chemical quality point of view, ground water in the area is fresh and potable with electrical conductivity (EC) generally less than 1200 µS/cm at 25°C. However, in ground water or aquifer strata at deeper levels in (lower Karewa formation) at places contain methane gas that makes the water non-potable at times.

4.6 STATUS OF GROUND WATER DEVELOPMENT

Ground water development in the district is on moderate scale restricted to the valley portions. All the major irrigation and drinking water supplies depend on the tube wells, dug wells in addition to various water supply schemes based on rivers/nallahs.

Public Health Engineering and Irrigation and Flood control departments are the nodal agencies in the state concerned with the water supplies for drinking and irrigation respectively. In hilly areas the supplies depends upon the springs and shallow tube wells and hand pumps. In valley portions these state departments drilled number of tube wells with the depth ranges from 50-100 meters, with discharges varies from 5 lps to 10 lps. Apart from the tube wells number of Hand pumps with the depth ranging from 30-60 mts depending upon the lithology of the area with a discharge varying from 0.5 lps to 2 lps feeds the drinking water requirements of the district.
Central Ground Water Board had constructed 18 exploratory wells up to the year 1989. Exploratory activities again resumed during the AAPs of 2005-2006 and 2006-2007 and constructed 06 tube wells in the district. The depth of exploratory wells ranges from 50 m to 405 m with a discharge varying from 65 lpm to 2700 lpm.

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 GROUND WATER DEVELOPMENT

Most of the district is in concentrated in valley portion drained by major river Jhelum and its tributaries. In the past, development of ground water was mainly through dug wells and percolation wells along the riverbeds, nallhas and also some springs has played a major role for sustainable domestic and irrigational purposes. In some of the areas, at present too these are the only sources of water.

However, in recent years modern means of ground water development have been employed. Public Health Engineering has been constructing number of hand pumps and shallow-moderate depth tube wells for large-scale water supplies.

5.2 WATER CONSERVATION AND ARTIFICIAL RECHARGE

Extraction of ground water through dug wells, hand pumps, tube wells, and the springs are the major sources of water supply to both rural and urban areas, but the availability of the water during summer is limited particularly in drought areas and requires immediate attention to augment this resources. Based on the climatic conditions, topography, hydrogeology of the area, suitable structure for rain water harvesting and artificial recharge to ground water is required. Roof tap rainwater harvesting needed to be adopted in the urban areas and proper scientific intervention for spring development and revival is required in water scarce areas.

In the hilly areas roof tap rainwater harvesting structures like storage tanks are recommended while in low hill ranges, check dams and roof tap rainwater harvesting structures can be adapted.

6.0 GROUND WATER RELATED ISSUES AND PROBLEMS

The Karewa formation which underlie the district are deposited under fluvio-glacial and lacustrine conditions. Due to the deposition under the lacustrine environment, occurrence of methane gas is the common phenomenon in the various part of the district. The lateral and vertical extent of the sediments of karewas varies and represents different hydro-geological set up. In the hard rock areas, the aquifers are discontinuous and localized and of different hydrogeological set up.

Some of the common issues are the occurrence of methane gas and accompanied silt, quality related problems particularly for 'Fe'. and occurrence of silty aquifers and boulders for development of ground water. These ground water issues and problems are localized and need to be focused by taking micro level studies in a particular area.

7.0 AWARENESS AND TRAINING ACTIVITY

So far neither Mass Awareness Programme (MAP) nor Water Management Training Programme (WMTP) is conducted by CGWB.

8.0 AREAS NOTIFIED BY CGWA/SGWA

The stage of ground water development in the district is 16% only and falls in safe category. Thus, no area or block has been notified for ground water development.

9.0 RECOMMENDATIONS

- In valley areas, in addition to the traditional ground water structures like dug wells and springs, shallow to medium depth tube wells can be constructed for developing the ground water resources. Ground water resources can also be developed by constructing infiltration galleries (Percolation wells).

- In hilly terrain, springs and perennial nallahs are the major sources of water. Medium to shallow bore holes and hand pumps are useful ground water structures for meeting the domestic needs.

- Monitoring of water levels and chemical quality at representative areas required to keep a watch on any adverse effect that ground water development may have in future.

- Traditional resources like springs needs to be revived, developed & protected on scientific lines for various use. The discharge of such springs can be sustained by construction of small check dams or subsurface dykes across the nallahs/tributaries in the downstream at favourable locations.

- Small ponds/tanks can be utilized for recharging ground water. These structures can be constructed for harvesting water and utilized for both recharging and meeting the domestic needs.

- Roof top rainwater harvesting practices must be adopted in hilly areas since the district receives precipitation in the form of snow and rain.

- 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.

Plate-I

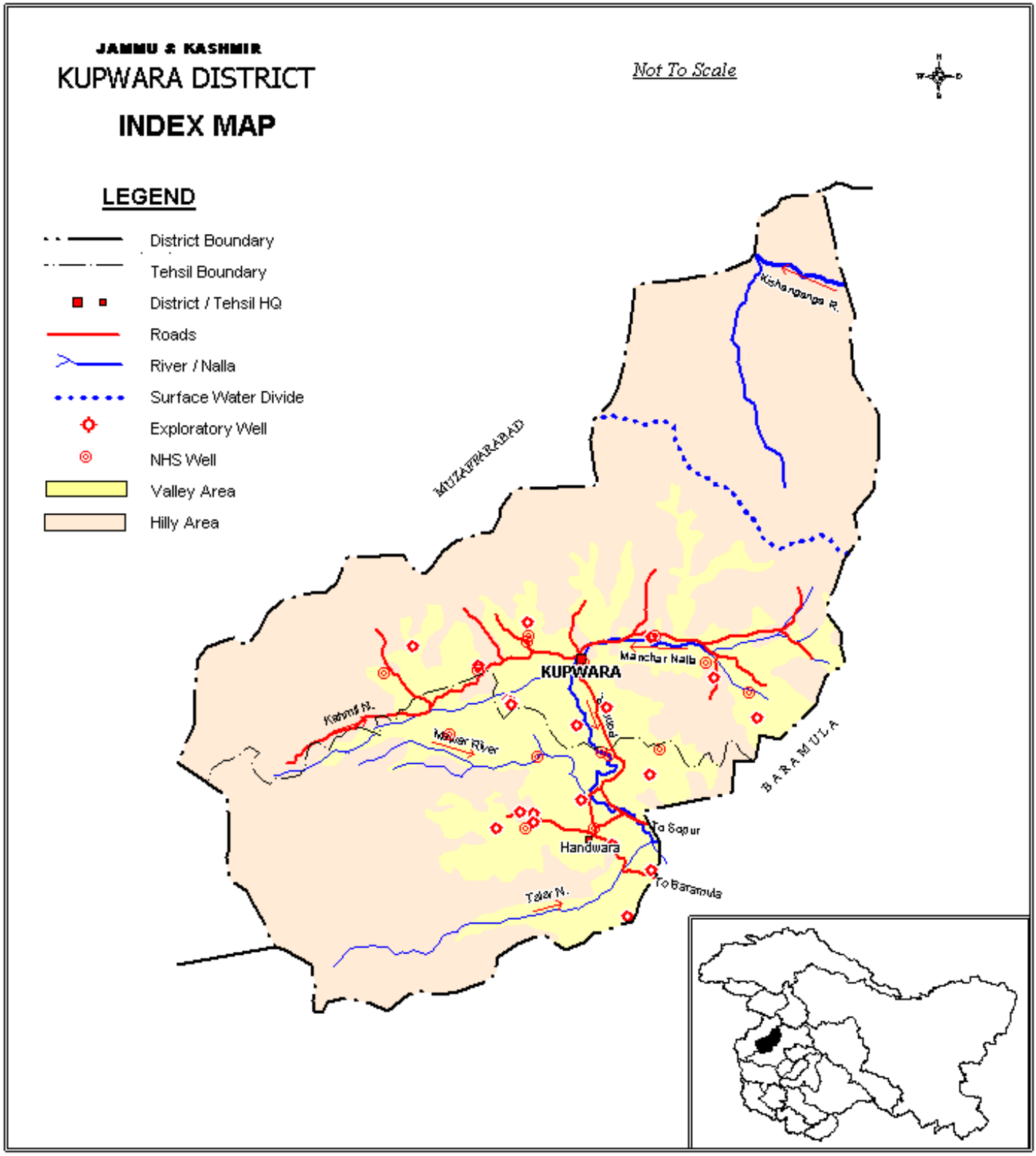
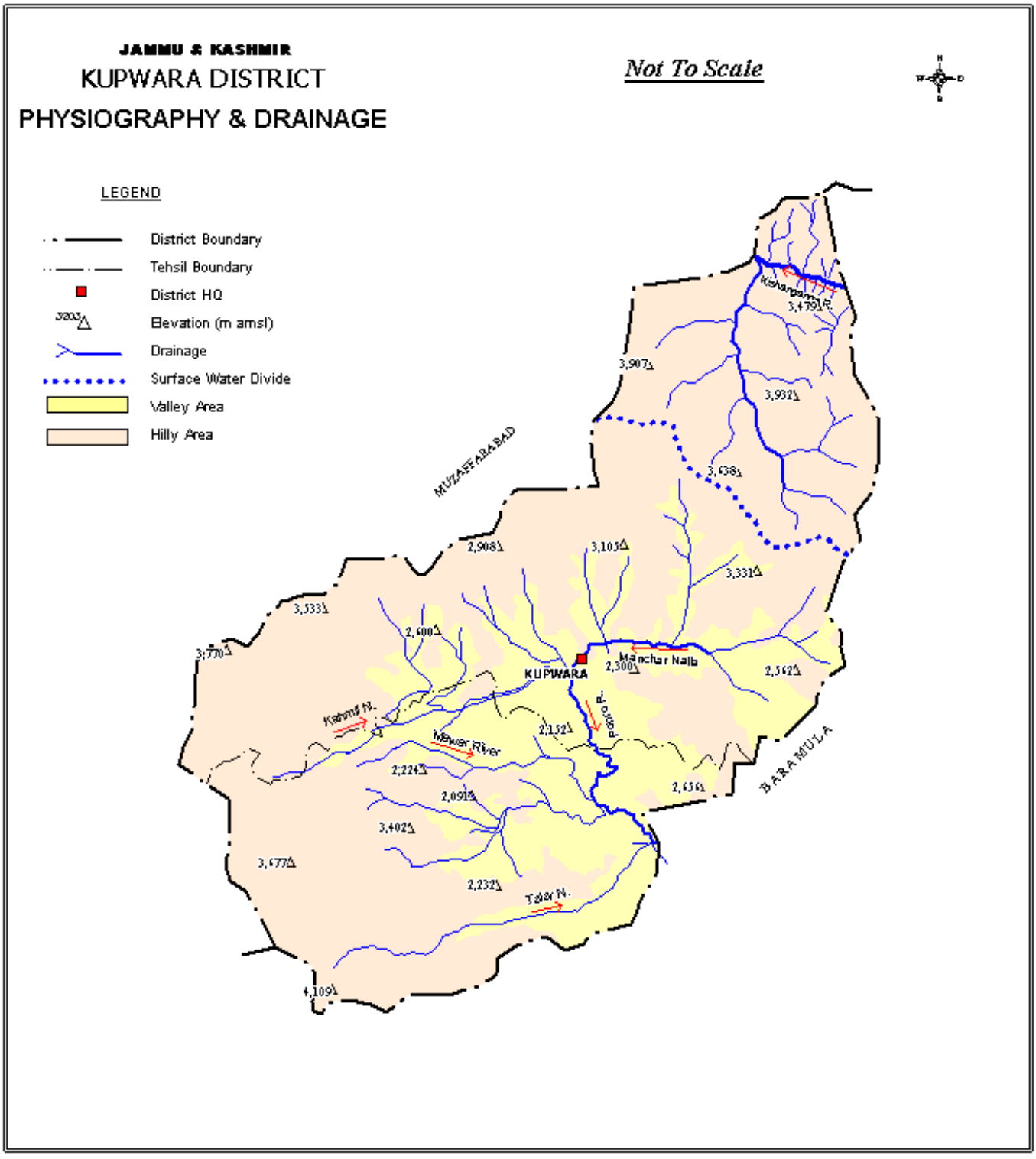

JAMMU & KASHMIR
KUPWARA DISTRICT
INDEX MAP
Not To Scale
LEGEND
District Boundary
Tehsil Boundary
District / Tehsil HQ
Roads
River / Nalla
Surface Water Divide
Exploratory Well
NHS Well
Valley Area
Hilly Area
MUZAFFARABAD
Kishanganga R.
KUPWARA
Manchar Nalla
Kahmil N.
Mawar River
Pohru
BARAMULA
To Sopur
Handwara
To Baramula
Talar N.

Plate-II


JAMMU & KASHMIR
KUPWARA DISTRICT
PHYSIOGRAPHY & DRAINAGE
Not To Scale
LEGEND
District Boundary
Tehsil Boundary
District HQ
Elevation (m amsl)
Drainage
Surface Water Divide
Valley Area
Hilly Area
MUZAFFARABAD
BARAMULA
KUPWARA
Manchar Nalla
Kishanganga R.
Kaboni N.
Mawar River
Pohru R.
Talar N.
3,907
3,932
3,438
2,908
3,105
3,331
3,533
3,770
2,600
2,300
2,542
2,152
2,224
2,091
2,656
3,402
3,477
2,232
4,109

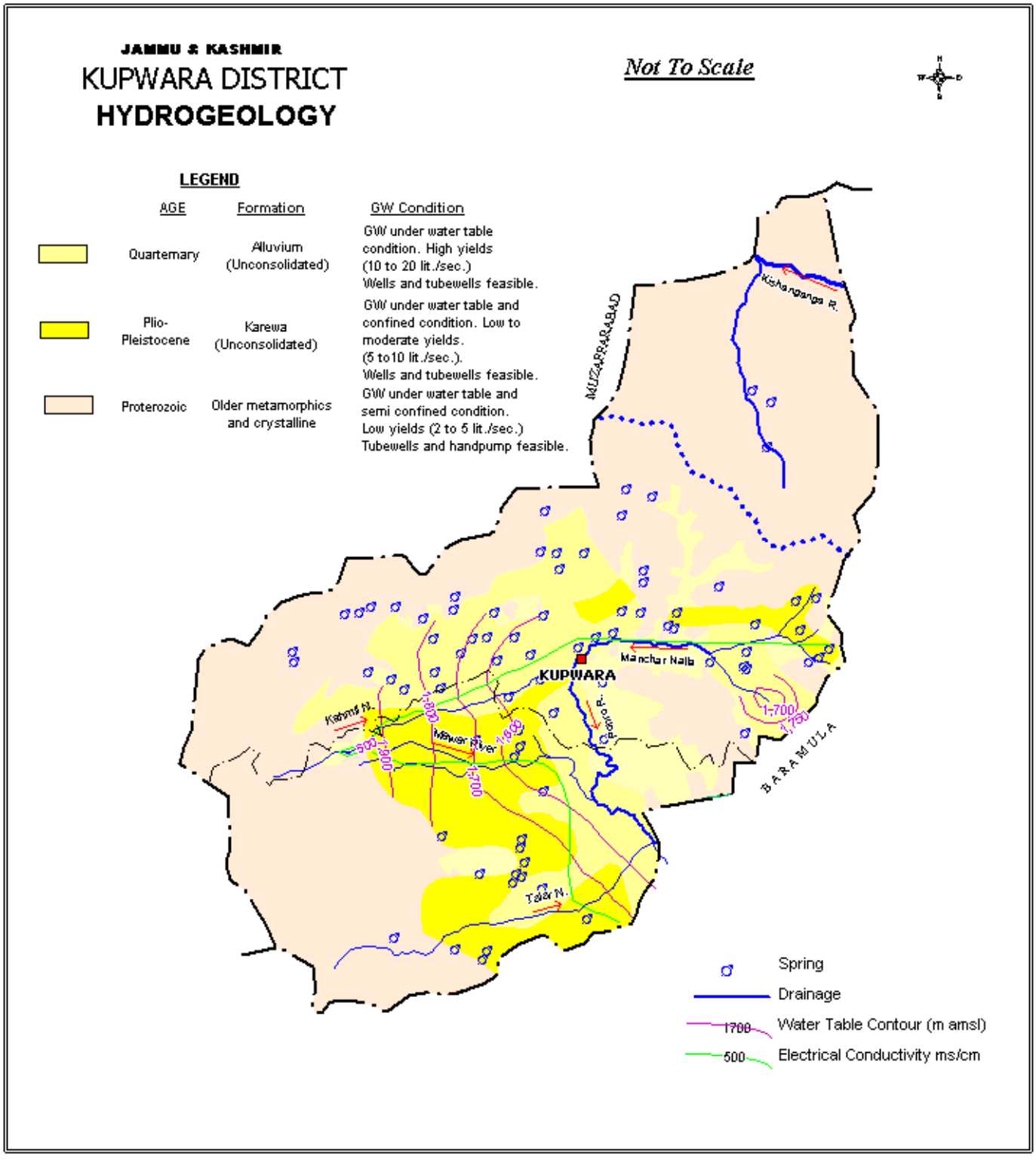
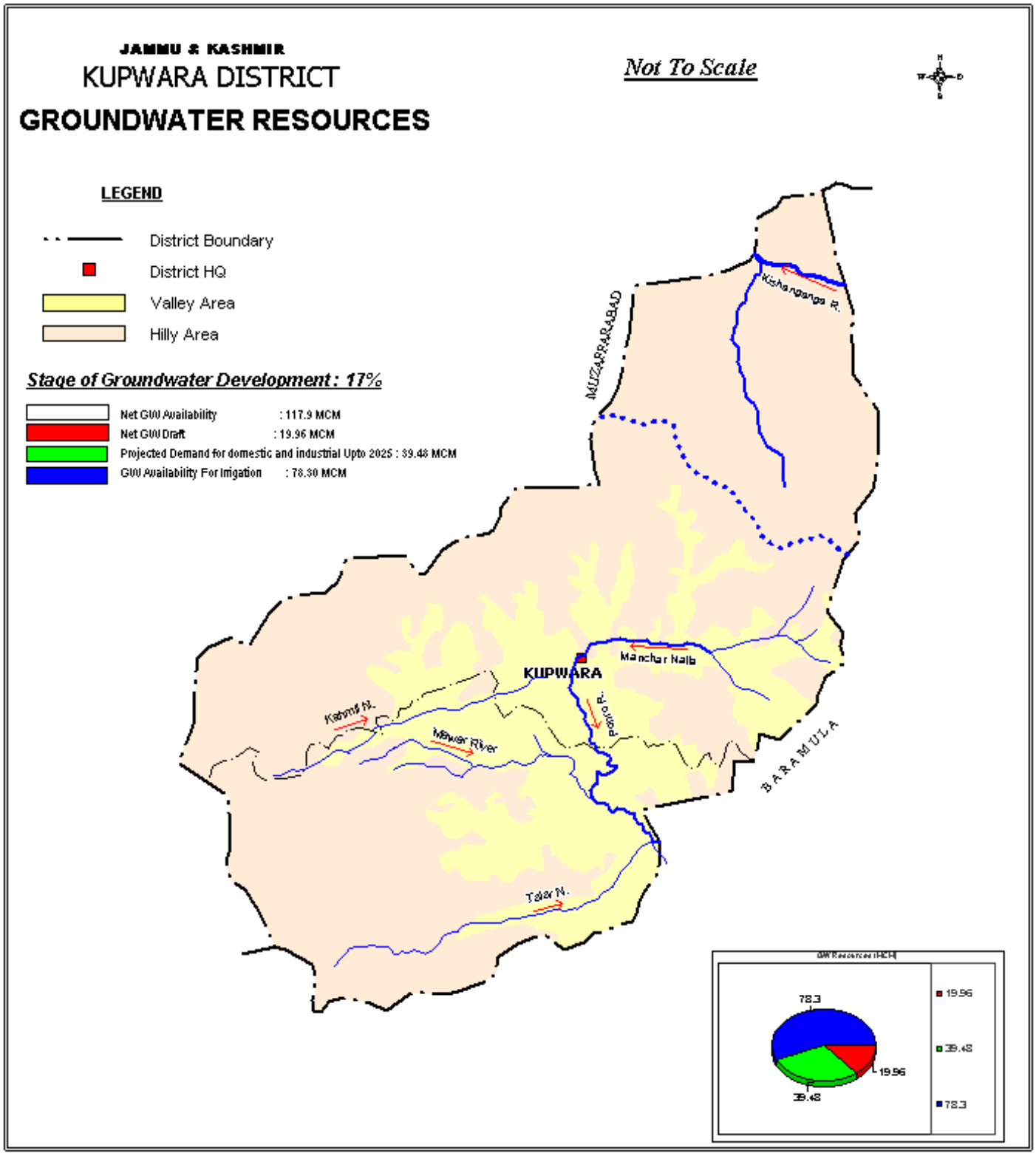
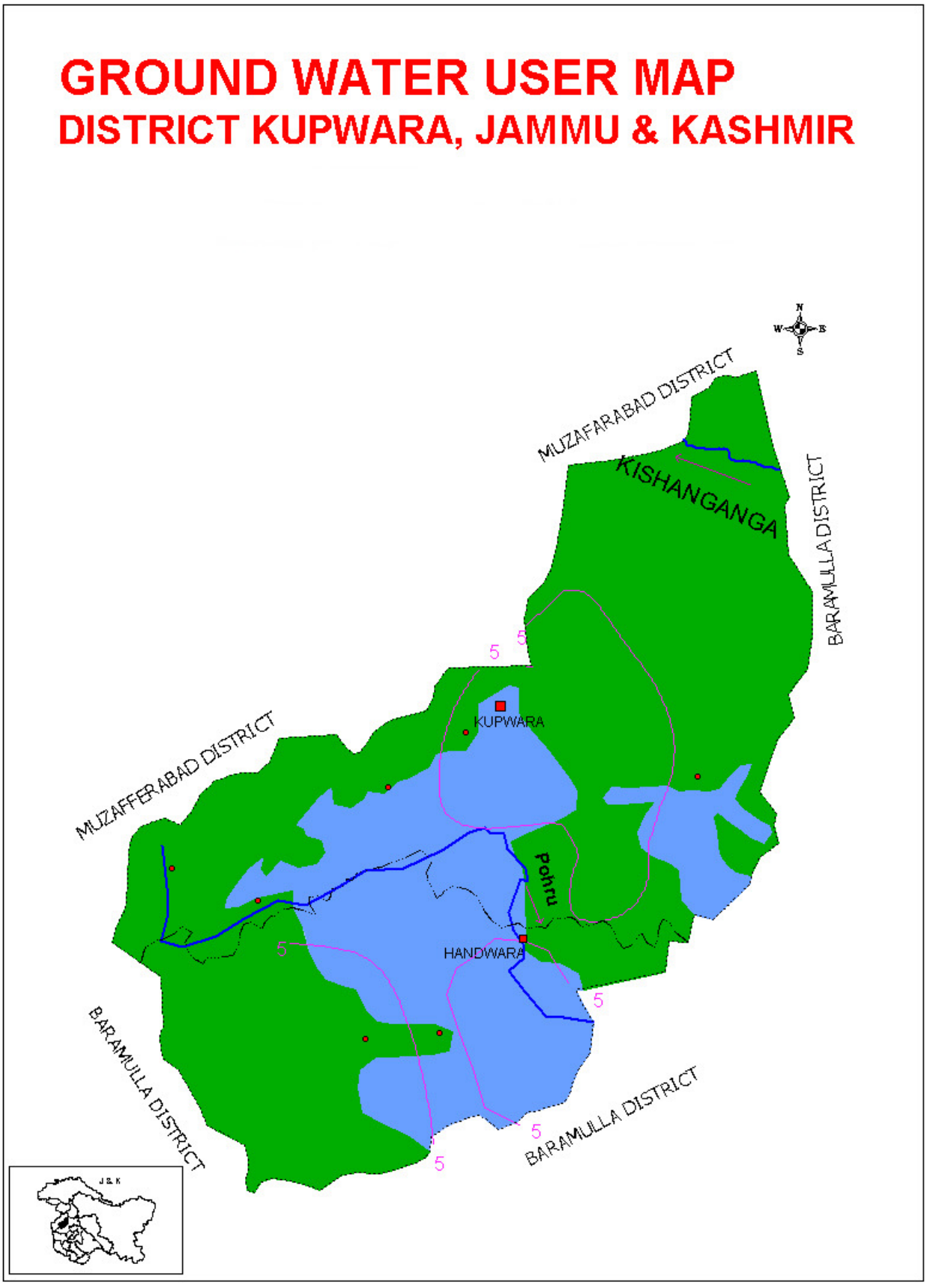

JAMMU & KASHMIR
KUPWARA DISTRICT
HYDROGEOLOGY
Not To Scale
LEGEND
AGE
Formation
GW Condition
Quartemary
Alluvium (Unconsolidated)
GW under water table condition. High yields (10 to 20 lit./sec.) Wells and tubewells feasible.
Plio-Pleistocene
Karewa (Unconsolidated)
GW under water table and confined condition. Low to moderate yields. (5 to10 lit./sec.). Wells and tubewells feasible.
Proterozoic
Older metamorphics and crystalline
GW under water table and semi confined condition. Low yields (2 to 5 lit./sec.) Tubewells and handpump feasible.
MUZAFFARABAD
Kishanganga R.
KUPWARA
Manchar Nalla
Kahmil N.
Mawar River
Tarar N.
BARAMULA
1700
1750
1800
1850
Spring
Drainage
Water Table Contour (m amsl)
Electrical Conductivity ms/cm

Plate-III

Plate IV


JAMMU & KASHMIR
KUPWARA DISTRICT
GROUNDWATER RESOURCES
Not To Scale
LEGEND
District Boundary
District HQ
Valley Area
Hilly Area
Stage of Groundwater Development : 17%
Net GW Availability : 117.9 MCM
Net GW Draft : 19.96 MCM
Projected Demand for domestic and industrial Upto 2025 : 39.48 MCM
GW Availability For Irrigation : 78.30 MCM
MUZAFFARABAD
Kishanganga R.
KUPWARA
Manchar Nalla
Pohru R.
Kishnai N.
Mawar River
BARAMULA
Talar N.
78.3
19.96
39.48

PlateV


GROUND WATER USER MAP
DISTRICT KUPWARA, JAMMU & KASHMIR
N
W
E
S
MUZAFARABAD DISTRICT
KISHANGANGA
BARAMULLA DISTRICT
KUPWARA
MUZAFFERABAD DISTRICT
Pohru
HANDWARA
BARAMULLA DISTRICT
BARAMULLA DISTRICT
5
J&K

LEGEND

DISTRICT KUPWARA

	Wells feasible	Rigs suitable	Depth of well (m)	Discharge (lpm)	Suitable artificial recharge structures
Soft rock aquifers	Tube well	Percussion, DTH with Odex	40 to 350 ✯	200 to 700	Check dam, Check Dam cum ground Water dam, Recharge Shaft/pit
	Dug Well	Poclain	6 to 10	200 to 500	
Hard rock aquifers	Tube well	DTH with Odex	60 to 80	200 to 600	
	Dug Well	Poclain	6 to 8	150 to 300	
	Spring Development			30 to 400	

5 Water level contour (m bgl) (Pre monsoon decadal mean, 1993-2002)

Springs

Tehsil boundary

District boundary

Major Drainage

Tehsil HQ

District HQ

OTHER INFORMATIONS

Total area	2379 sq.km
No. of tehsils	3
Major drainage	Kishanganga, Pohru Rivers
Population	640013 (2001 Census)
Rainfall	869 mm
Temperature	-4^0 C to 36^0 C
Regional geology	Soft rock : - Alluvium, Karewas
	Hard rock : - Panjal traps
Ground water quality	EC<1250 micro mhos/cm at 25^0C
Stage of GW development	23.57 %
Name of watershed/ tehsil showing intensive GW development	Nil

Note : ✯ limited to explored depth

Areas with depth to water level > 8 m bgl are suitable for artificial recharge.