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Government of India
Ministry Of Water Resources

GROUND WATER INFORMATION BOOKLET
MANDI DISTRICT, HIMACHAL PRADESH

CENTRAL GROUND WATER BOARD
NORTHERN HIMALAYAN REGION
DHARAMSHALA
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Contributors

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Our Vision
Water security through sound groundwater management

GROUND WATER INFORMATION BOOKLET
Mandi District, Himachal Pradesh

CONTENTS

DISTRICT AT A GLANCE

MANDI DISTRICT AT A GLANCE

Sl. No	*ITEMS*	*Statistics*
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	3,950
	ii) Administrative Divisions (2001) • Number of Tehsil & Sub-tehsils • Number of CD Blocks • Number of Panchayats • Number of Villages	 9 & 7 10 473 3,338
	iii) Population (2011 Census) • Total population • Population Density (pers/sq km) • Rural & Urban Population (in percent) • SC & ST Population (in percent) • Sex Ratio (females per 1000 males)	 9,99,777 persons 253 93.7 & 6.3 29.4 & 1.3 1007
	iv) Average Annual Rainfall (mm)	1331.50
2.	GEOMORPHOLOGY	
	Major Physiographic units	• High Hill Ranges • Denuded Hills • Valleys & Terraces
	Altitude Range	550 – 3960 m amsl
	Major Drainages • Beas Basin (70%) • Sutlej Basin (30%)	 Suketi khad, Tirthan river, Uhl river, Rana khad. Annun khad, Chainra khad.
3.	LAND USE (2008-09)	
	• Forest area (ha) • Total cropped area (ha)	175200 159200
4.	MAJOR SOIL TYPES	• Mountainous Soil • Sub-Mountainous Soil
	AREA UNDER PRINCIPAL CROPS (2008-09)	Hectares
	• Rice	19,190
	• Wheat	65,839
	• Maize	48,346
	• Barley	3,247
	• Pulses	6,192

5.	IRRIGATION BY DIFFERENT SOURCES (2008-09)	
	• Net area irrigated through different sources	12,608 (ha)
6.	NUMBER OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.3.2013) • No. of Dug Wells • No. of Piezometers	 9 Nil
7.	PREDOMINANT GEOLOGICAL FORMATIONS	• Quaternary Alluvium • Tertiary (Siwaliks) • Older Crystalline & Metamorphic rocks
8.	HYDROGEOLOGY	
	Major Water Bearing Formations 1. Consolidated sediments / Hard Rocks (Older crystalline & Metamorphics) • Yield prospects • GW structures	Covering major part (65%) Low (<3 lps) Springs & Handpumps
	2. Semi consolidated sediments (Siwalik & Subathu Group)	Covering (32%)
	• Yield prospects • GW structures	Low to Moderate (2-10 lps) Springs & Handpumps
	3. Unconsolidated porous sediments (Alluvium)	Valley area (3%)
	• Yield prospects • GW structures	High (10-30 lps) Open wells & Shallow TW
	Depth to water level Pre-monsoon Post - monsoon	 0.86 to 9.92 mbgl 0.37 to 5.83 mbgl
9.	GROUND WATER EXPLORATION BY CGWB (As on 31.3.2013)	
	• No of wells drilled	19 (EW)
	• Depth Range (m)	38.25 – 140.98
	• Discharge (lpm)	15 – 999.24
	• Transmissivity (m^2/day)	18.46 – 1248
10.	GROUND WATER QUALITY	
	Presence of Chemical constituents more than permissible limits (eg. EC, F, As, Fe)	Nil

11.	DYNAMIC GROUND WATER RESOURCES (2011) (Balh valley: 9500 ha)	
	• Net Ground Water Available	5,942.33 ham
	• Annual Ground Water Draft	912.77 ham
	• Stage of Ground Water Development	15.36 %
12.	AWARENESS AND TRAINING ACTIVITY	
	Mass Awareness Programmes • Place / Date / No of participants	4 No. 1) Bhararu / 6.1.04 / 2000 2) Bajaura / 29.3.04 / 1000 3) Katindi / 12.12.04 / 1000 4) Panarsa / 17.2.06 / 1500
	Water Management Training Programmes	3 No.
	• Place / Date / No of participants	1) Bajaura / 29.3.04 / 50 2) Katindi / 11.12.04 / 50 3) Padhar / 23.12.06 / 80
13.	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	Nil
14.	GROUND WATER CONTROL AND REGULATION	
	Number of OE Blocks	Nil
	No of Critical Blocks	Nil
	No of blocks notified	Nil
15.	MAJOR GROUND WATER PROBLEMS AND ISSUES	
	Silt pollution	In Suketi khad (Bahl valley)
	Depletion of water table	In valley area mild decline
	Water scarcity & Deep water levels	In higher hilly areas
	Water logging	In isolated pockets in Balh valley

GROUND WATER INFORMATION BOOKLET
MANDI DISTRICT, HIMACHAL PRADESH

1.0 INTRODUCTION

Mandi district is a densely populated and centrally located district of Himachal Pradesh. The district is entirely hilly, except a few isolated patches of small and fertile valleys. The district, with its headquarter at Mandi town, lies between 31°13' and 32° 05' north latitudes and 76°37' and 77°25' east longitudes and is covered by Survey of India degree-sheet no 53A, 53E and 52D. The district is bounded by Kangra district on the northwest, Kullu district on the east, Shimla and Solan districts on the south and southwest respectively, Bilaspur and Hamirpur districts on the southwest.

The district has a total geographical area of 3,950 sq kms, covers 7.10 % area and ranks 7th in the State. There are 6 towns and 3,338 villages in the district. The district has been divided into 6 divisions [Sadar, Sarkaghat, Sundernagar, Karsog, Gohar, Jogindernagar]. There are 9 tehsils [Sadar, Thunag, Sundernagar, Sarkaghat, Padhar, Jogindernagar, Lad Bhraol, Karsog, Chachyot] and 7 sub-tehsils [Kotali, Aut, Nihari, Baldwara, Dharampur, Sandhol, Balichowki]. Further, for developmental purposes, the district has been subdivided into 10 Community Development Blocks viz., Chauntra, Drang, Dharmpur, Gopalpur, Sundernagar, Rawalsar, Mandi Sadar, Chachyot, Seraj and Karsog.

As per 2011 census, the district has a population of 9,99,777 persons with a population density of 253 persons per sq km. The male and female population in the district is 4,98,065 and 5,01,712 respectively, with a sex ratio of 1007 females per 1000 males.

The major sources of irritation are small water channels or the Kuhls in the district and an area of 12608 ha is brought under irrigation by various sources like canals, tanks, wells and other sources. A sizeable part of the cultivated area of the district is not having any assured irrigation facilities and the agriculturists have to depend on the vagaries of weather. Under the various plans, the construction of Kuhls and lift irrigation schemes are being taken up in the district.

CGWB has carried out extensive hydrogeological studies, both by conventional and non-conventional methods in the district. Under Groundwater Exploration, 19 exploratory wells have been drilled, with a depth range from 38.25 to 140.98m. CGWB monitors 9 National Hydrograph Network Stations, mainly in Balh valley for ground water levels and its quality.

2.0 CLIMATE & RAINFALL

The climate of the district is sub-tropical in the valleys and tends to be temperate near the hilltops. In the higher region, the climate remains cold throughout the year. In winter snow often comes down to 1300 m amsl. Normally, it starts melting from the end of March from places lying below 3300 m. In summer, the whole *Balh* valley and other low altitudes are quite hot.

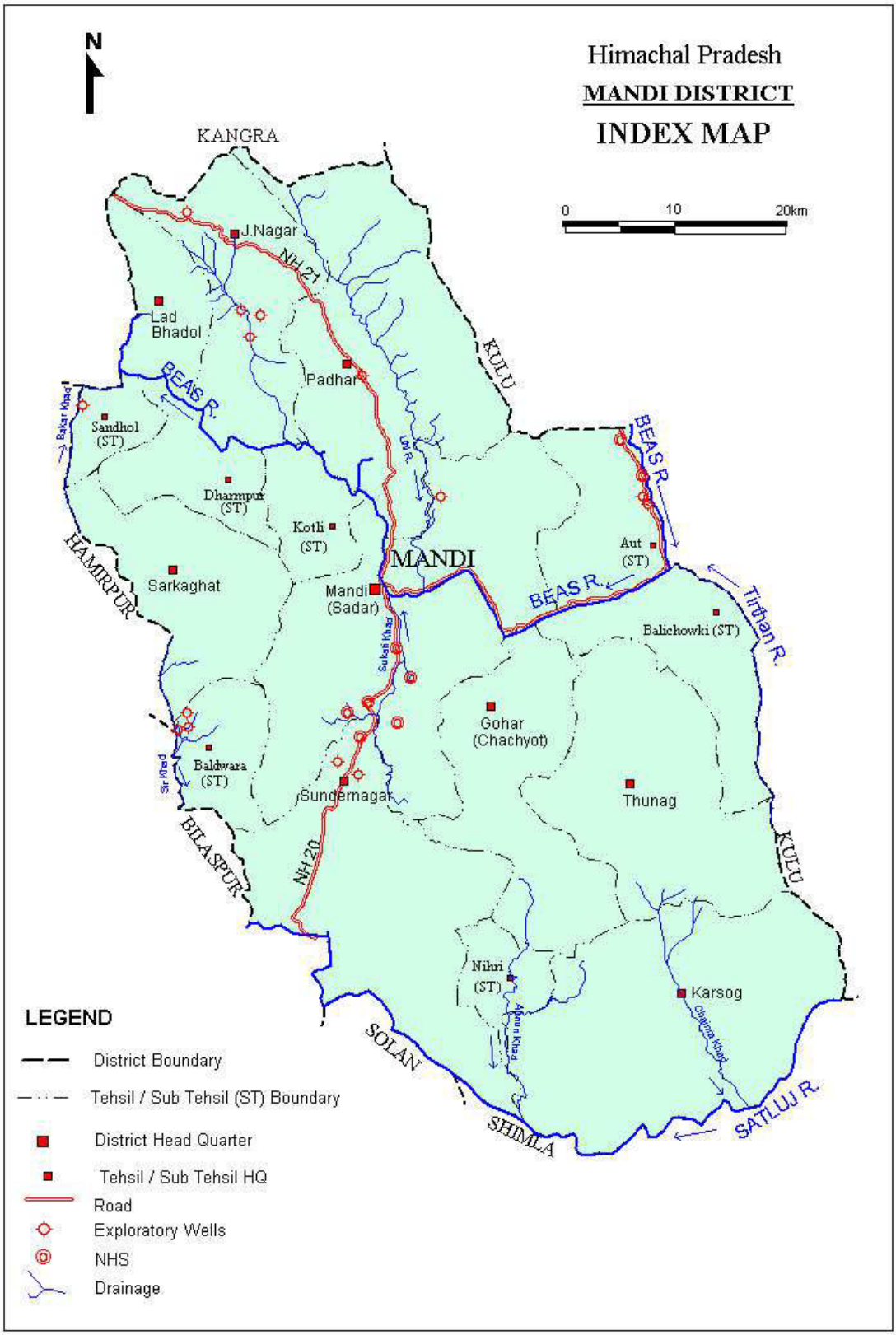
N
Himachal Pradesh
MANDI DISTRICT
INDEX MAP
0
10
20km
KANGRA
J.Nagar
NH-21
Lad Bhadol
Padhar
KULU
BEAS R.
Bakar Khad
Sandhol (ST)
Dharmpur (ST)
Kotli (ST)
MANDI
Aut (ST)
HAMIRPUR
Sarkaghat
Mandi (Sadar)
Suketi Khad
Balichowki (ST)
Tirthan R.
Gohar (Chachyot)
Sir Khad
Baldwara (ST)
Sundernagar
Thunag
BILASPUR
NH-20
Nihri (ST)
Karsog
Chamma Khad
SOLAN
SHIMLA
SATLUJ R.
LEGEND
District Boundary
Tehsil / Sub Tehsil (ST) Boundary
District Head Quarter
Tehsil / Sub Tehsil HQ
Road
Exploratory Wells
NHS
Drainage

Figure: 1

The winter starts from the middle of November and continues till the middle of March. Thereafter, the mercury continues to rise till the onset of the monsoon, which starts from the last week of June or early July and continues till the middle of September. During October and November, the nights are pleasant, whereas the days are a little bit hot. Average minimum and maximum temperature in the district varies from 3° C to 35° C.

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 1331.50 mm. Annual average rainfall from place to place in the district is highly variable and ranges from 700 to more than 2000 mm at Jogindernagar. During winters snow fall often occurs down to elevation of 1300m amsl.

3.0 GEOMORPHOLOGY & SOIL TYPES

Mandi district presents an intricate mosaic of mountain ranges, hills and valleys. It is primarily a hilly district with altitudes ranging from 550 m near Sandhol where the Beas river leaves the district, to about 3960 m amsl near Kullu border. There is a general increase in elevation from west to east and from south to north. Master slope is south-westerly. The south western part consists of Siwalik ranges having scarped slopes. There are few small intermontane valleys; prominent among them is the Balh valley, located in the lesser Himalayan ranges, having an average altitude of about 790 m amsl and have a general slope towards NNE. The valley floor is undulating and is marked by low hillocks and terraces fringing the hills and intervening low alluvial plain.

The Beas and Satluj rivers form the major drainage system in the district. The river Beas and its tributaries, drain about 70% of the district area in the northern part, whereas the area in the south is drained by the river Satluj. Suketi khad and its tributaries, chiefly drain Balh valley. The Suketi khad maintains a perennial flow, because of effluent seepage from groundwater. There are three important lakes in the district, namely *Rewalsar*, *Prasher* and *Kamrunag*.

Two types of soils are mainly observed in the district viz. ***Sub-Mountainous Soil*** occurring in Seraj and Karsog blocks and ***Mountainous Soil*** occurring in remaining eight blocks of the district.

The sub-mountainous soil is high in organic carbon, low in available phosphorous and medium in potash, whereas the mountainous soil is brown in colour, medium in available nitrogen & potash and deficient in available phosphorous. The soil reaction is slightly acidic to neutral and texture in general varies from loam to sandy loam, except in low valley areas being heavy textured.

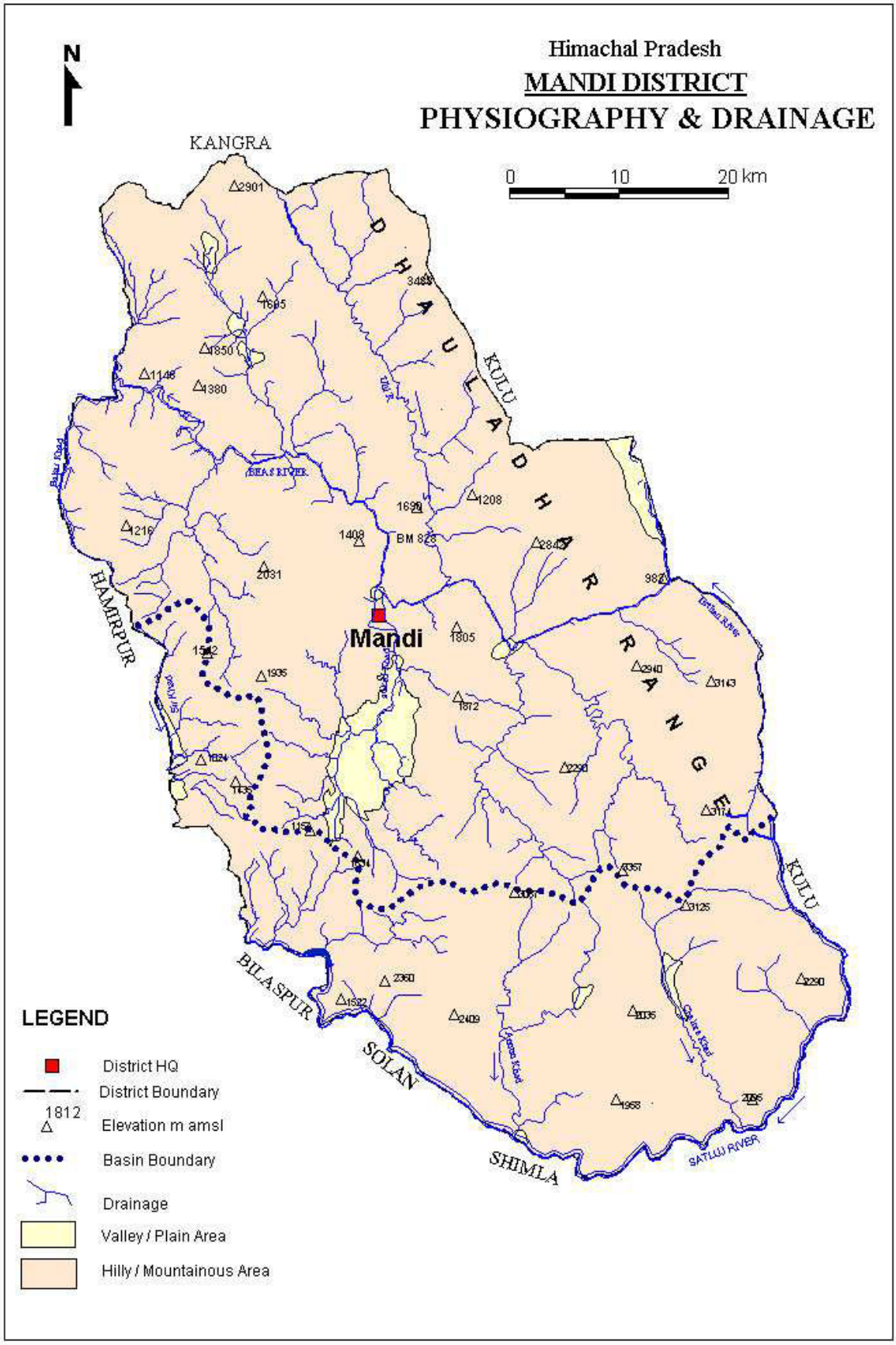
Himachal Pradesh
MANDI DISTRICT
PHYSIOGRAPHY & DRAINAGE
N
0 10 20 km
KANGRA
DHAULADHAR RANGE
KULU
HAMIRPUR
BILASPUR
SOLAN
SHIMLA
KULU
Mandi
BEAS RIVER
SATLUJ RIVER
LEGEND
District HQ
District Boundary
1812
Elevation m amsl
Basin Boundary
Drainage
Valley / Plain Area
Hilly / Mountainous Area

Figure: 2

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

The rock formations occupying the district range from pre-Cambrian to Quaternary period. The generalized geological succession in the district is given below.

Age	*Formation*	*Lithology*
Quaternary	Alluvium; Terrace & Fluvial deposits	Alluvium, clay, sands, gravels, pebbles, boulders and cobbles
Lower Pleistocene to Middle Miocene	Siwalik Group	Clay, siltstones, sandstones, and boulder beds
Oligocene to Lower Miocene	Dharamsala/ Kasauli Formation (Sabathu Group)	Grey/green sandstones, splintery shale, clay etc.
Permian	Basic Volcanic intrusives	
Proterozoic	Shimla Group	Phyllites, Quartzites, limestone, shale and dolomite
	Shali /Sundernagar /Kullu Formation	Phyllites, Quartzites, dolomite conglomerate and limestone
	Jutogh Group	Quartzites, Schists and phyllites
		Dalhousie / Kullu granites and gneisses

Hard formations, form hilly and mountainous terrain and mainly comprises of igneous and metamorphic rocks, belonging to the Jutogh, Shali/ Largi and Shimla group and occupy the major part of the area in the northern, central and eastern part. Granites and gneisses are intruded in the meta-sediments of Shali/Largi and Shimla group. In the western and southern parts sediments comprising of sandstone, shale, siltstone, conglomerate etc of Dharamshala/Sabathu group and Siwalik group of Tertiary age are observed. Alluvium, terrace deposits, fluvial deposits of Quaternary period occur in the intermontane valleys, viz., Balh valley, Sarkaghat valley etc., and constitute an important unit from ground water point of view.

Hydrogeologically, the district is divided into two distinct and 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.

The fissured formations includes the semi-consolidated to consolidated (hard) rocks exposed in the district and are of sedimentary, metamorphic and igneous origin. These form low and high hill ranges throughout the district. Fractured and jointed sandstone, siltstone forms low potential aquifers in the area. In general weathered and fractured hard rocks are favorable for groundwater aquifer. Fracture zones and contact zones form the important aquifers in the topographic low areas, with poor to moderate yields. These fracture or fault zones form potential ground water zones. Ground water in these hilly areas oozes in the form of seepages, springs and utilized for domestic and other uses. At places, shallow boreholes fitted with hand pumps have been constructed to develop ground water. The yield of the bore wells constructed along the fault/fracture/contact zones varies from less than 1

to 30 m^3/ hour. Weathered mantle in low topographic areas, also form poor aquifers. Bowris are constructed in oozing out spring/seepage zones for collecting water to fulfill the domestic water needs.

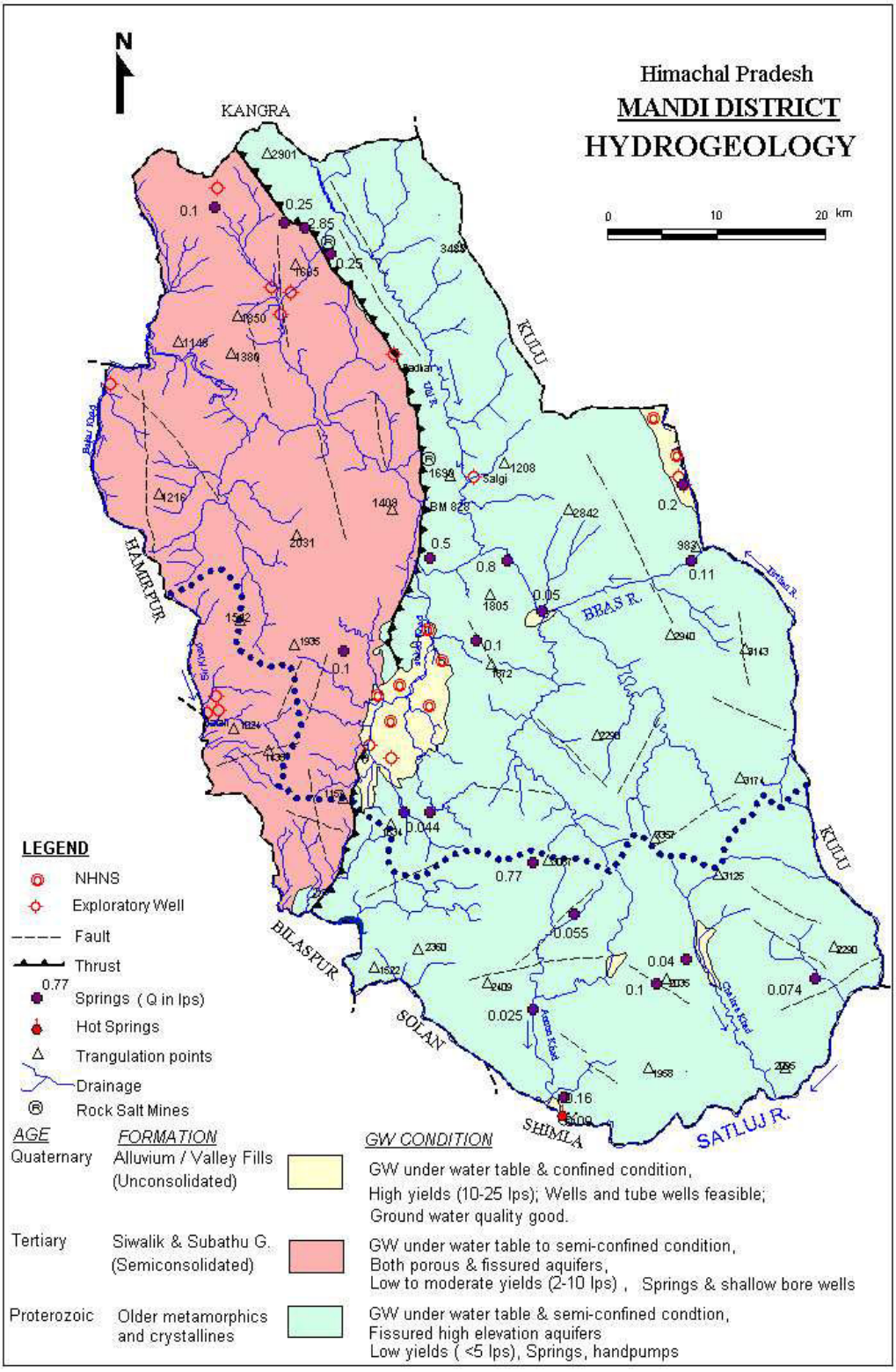

Figure: 3

The unconsolidated sediments comprising fluvial, channel deposits, valley fills and terrace deposits and alluvial fan constitute the porous aquifers in the district. These sediments consist of sand, gravels, cobbles, pebbles and boulders interlayered with clay beds. These sediments form prolific aquifers. In Balh valley, a part of Sarkaghat area, Kullu valley and isolated small pockets in the district, these unconsolidated sediments forming aquifer are observed. In Balh valley, ground water occurs under phreatic to confined conditions. Dug wells form major source of water for domestic and irrigation water supply. The depth of the wells ranges from 8 m to 26 m bgl, where depth to water level ranges from near surface 0.86m bgl to 9.92m bgl. In low plains, water levels are shallow and less than 5m and become deeper in terraces and fringe areas. Large number of tube wells, ranging in depth from 38.25 m to 140.98m have been drilled/constructed by tapping granular horizons, where water level ranges from artesian/free flow to about 19.35m bgl. The yield of the wells ranges from 15 to 999.24 lpm for economic drawdown. Free flowing conditions are observed in low-lying areas of Suketi khad in southwestern part of Balh valley.

In Balh valley, CGWB monitors 9 hydrograph stations for groundwater regime monitoring under its National Network. The water levels are monitored four times and ground water quality once during pre-monsoon period every year. During the pre-monsoon (May 2012), depth to water level ranged between 0.86 to 9.92 mbgl. Similarly, during the post-monsoon (November 2012), depth to water level ranged between 0.37 to 5.83m bgl. Depth to water level map of pre-monsoon 2012, is given in Figure - 4.

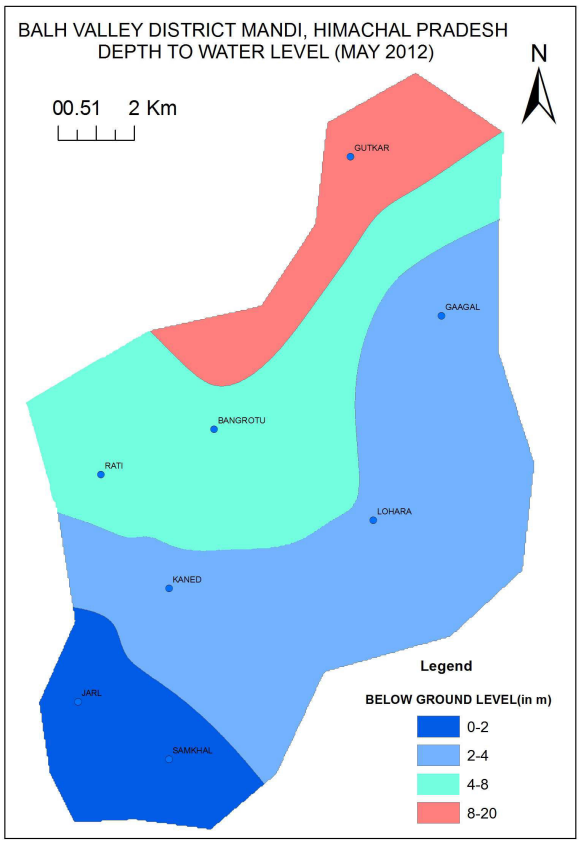

Figure: 4

4.2 Ground Water Resources

Rainfall is the major source of groundwater recharge, apart from the influent seepage from the rivers, irrigated fields and inflow from upland areas, whereas discharge from ground water mainly takes place through wells and tube wells; effluent seepages of ground water in the form of springs and base flow in streams etc.

Ground water resources and irrigation potential for Balh valley in Mandi district have been computed as per the GEC-97 methodology. The resources for the year 2011, are as follows.

1.	Area (Balh valley) considered for GW Assessment	9500 ha.
2.	Net Ground Water Available	5942.33 ham
3.	Annual Ground Water Draft	912.77 ham
4.	Stage of Ground Water Development	15.36%

The stage of ground water development in Balh valley in Mandi district is 15.36% and falls under "Safe" category. There is thus, a scope for further ground water development.

4.3 Ground Water Quality

CGWB monitors the ground water quality of shallow aquifers through 9 National Hydrograph Stations, located mostly in Balh valley and southernmost extension of Kullu valley falling in district Mandi. As per ground water samples collected in May 2012, the range of chemical parameters in Balh valley is summarized below.

S. No	*Parameters*		*Range*	
			Min	*Max*
1.	pH		7.38	7.89
2.	EC	µS/cm	180	1320
3.	HCO_3	(mg/l)	67	214
4.	Cl	(mg/l)	4	255
5.	NO_3	(mg/l)	0.90	98
6.	F	(mg/l)	0.00	0.30
7.	Ca	(mg/l)	14	66
8.	Mg	(mg/l)	6	54
9.	Na	(mg/l)	11	102
10.	K	(mg/l)	2.20	16
11.	TH as $CaCO_3$	(mg/l)	108	792

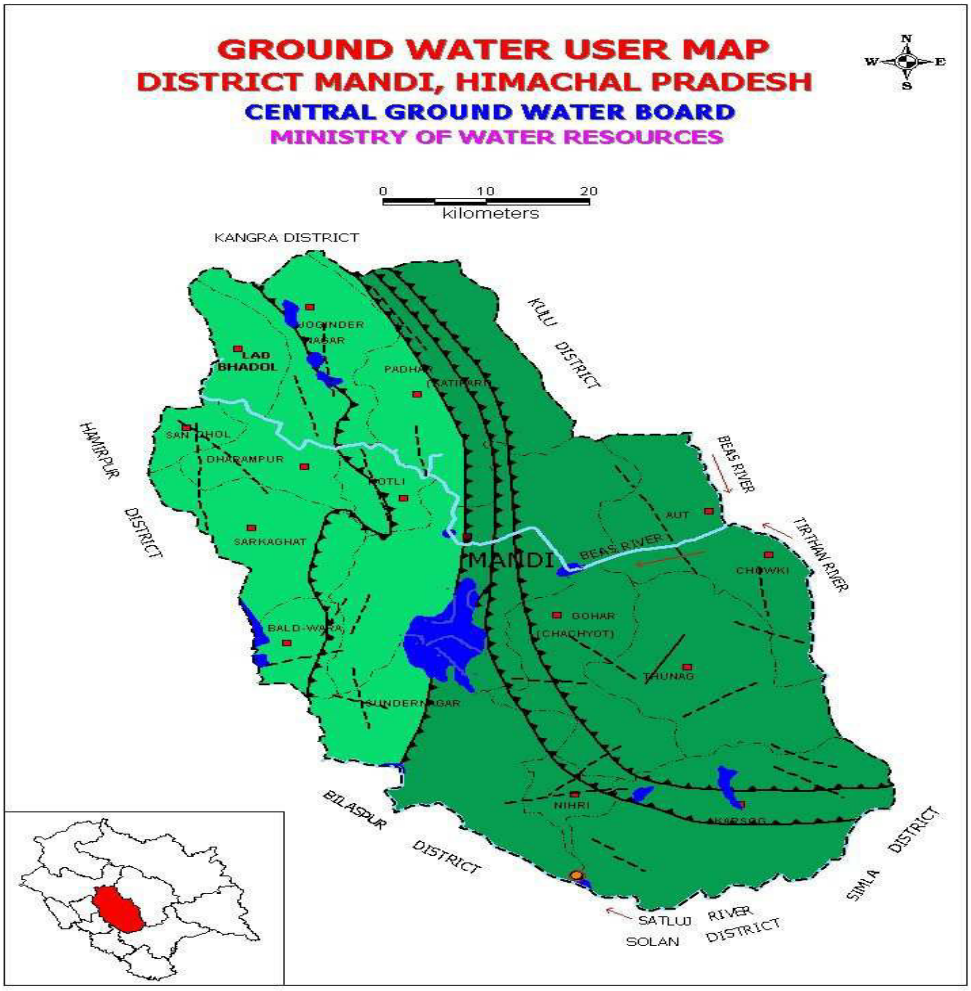

Figure: 5

LEGEND

	Wells feasible	Rigs suitable	Depth of Well (m)	Discharge (lpm)	Suitable artificial Recharge structures
Soft rock aquifers	Tube well Dug well	Percussion & Percussion cum Rotary Manual	100-120 10-20	1200-2500 300-500	Check dam, Check dam cum ground water dam, Recharge shaft
Hard rock aquifers	Bore well Dug well Spring Development	DTH with Odex Manual	100-150 10-20	1000-2000 300-500 30-2000	
Thrust					
Major drainage Hot water spring (50^{0}C) Spring			Fault/Lineament Tehsil boundary District boundary State boundary		

Ground water quality in the district is in general good, both for irrigation and domestic purposes. From the samples collected from ground water sources viz., wells, tube wells, hand pumps and springs, the EC in ground water is generally below 1000 μS/cm at 25^0 C, except at Bangrotu dug well (1320μS/cm). Other chemical parameters are also within the permissible limits.

However, quality of water from hot springs in Tattapani is brackish, with EC ranging from 1480 to 9700 μS/cm and fluoride concentration ranging from 1.03 to 1.66 mg/l. Further, the water quality in the salt mine areas viz. Gumma and Drang is highly saline and form the potential area of contamination. Higher concentration of fluoride, more than permissible limits i.e. 1.5 mg/l is also noted at few locations like Alsindhi and Mandi town in the district. There is an urgent need to have proper water quality monitoring & checks on regular basis.

4.4 Status of Ground Water Development

Ground water development in the district on moderate scale is restricted to Balh valley, Karsog valley and small valleys along the major streams and rivers. In these areas, all the major irrigation and drinking water supplies depend on tube wells and dug wells, in addition to various water supply schemes based on rivers / nallas.

Irrigation & Public Health Department, being a nodal agency in the State entrusted with water supply and irrigation, taps number of springs, yielding discharge less than 1 lps to more than 5 lps, which are perennial and water supply schemes are based on these springs. Generally, these springs are tapped at the source, so that the water can be supplied under gravity. These springs are generally contact or depression springs.

State departments has also drilled handpumps in the district, with the depth ranging from 30 to 60 m depending upon the lithology of the area, with a discharge varying from 0.5 lps to 2 lps. Few of them, have been energized with submersible pumps.

CGWB has so far constructed 19 exploratory wells in the district, in the depth range of 38.25 to 140.98 m bgl. The discharge of these wells ranges from less than 15 lpm to 999.24 lpm.

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 of water for the settlements. However, modern means for tapping the ground water have been employed in recent years. During the last 15-20 years, Irrigation and Public Health Department has constructed number of shallow depth bore wells and fitted with handpumps in these areas.

High hill ranges occupy more than 90 % of the area of the district. During the past years, the traditional ground water sources have served the settlements. Ground water development on moderate scale is seen in the valley areas particularly in Balh valley. In addition to handpumps, under the Indo-German project, taken up during the 80s, number of shallow depth, tube wells were drilled to provide assured water supply. Other valley areas like Chauntra, Karsog so far do not have such ground water structures and these are to be explored for developing the ground water resource. There exists a scope to explore the potentialities of rest of the areas for ground water in low lying valley areas. The entire hilly area of the district is feasible for only drilling shallow to medium depth bore wells.

5.2 Water Conservation & Artificial Recharge

Ground water extraction through dug wells, hand pumps, tube-wells, bowrie*s* and the springs are the major sources of water supply to both rural and urban areas, but the availability of water during summer is limited, particularly 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 and artificial recharge to ground water are required. Roof top rainwater harvesting need to be adopted in urban areas and proper scientific intervention for spring development and revival of water bodies is required in water scarce areas.

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

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

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

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 deep water levels in some of the areas, as noticed in northwestern part, pollution of water sources due to unplanned disposal of garbage & lack of sewerage system; silt disposal in water courses in Balh valley also need to be studied for its effect on ground water.

7.0 AWARENESS & TRAINING ACTIVITY

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

- Mass awareness programme on rainwater harvesting was conducted at Govt. Senior Sec. School, Bhararu on 6.1.2004, where Sh. Kaul Singh Thakur, Hon'ble Minister for Irrigation & Public Health, Govt. of HP was the Chief Guest. The function was

attended by officers and staff of I&PH, HPSEB apart from school children. Lectures were delivered by the Chief Guest and scientists of CGWB on ground water conservation and management. In all, more than 2000 persons including students attended the programme. Students from VI-XII participated in painting and debate competition on ground water.

- Mass awareness cum training programme on rainwater harvesting was conducted at Krishi Vigyan Kendra, Bajaura on 29.3.2004 where Sh. S.S. Chauhan, Member, CGWB was the Chief Guest. Sh. Tej Pratap Singh, Vice Chancellor, CSKKVV Palampur presided over the function. The function was attended by officers and staff of department of Agriculture and the farmers from nearby villages of Bajaura. Lectures were delivered by the Chief Guest and scientists of CGWB on ground water conservation and management. In all, about 1000 persons attended the mass awareness programme and 50 persons during the training programme.

- Training cum mass awareness programme on rainwater harvesting and artificial recharge to ground water was conducted at Govt. Senior Sec. School, Katindi on 11.12.2004 & 12.12.2004 where Sh. Kaul Singh Thakur, Hon'ble Minister for Irritation & Public Health, Govt of HP was the Chief Guest. The function was attended by school teachers, staff and officers from various Govt. departments, apart from school children. Lectures were delivered by the Chief Guest, Regional Director and delegates on rain water harvesting, water conservation and management. In all, about 50 persons mainly teachers and officers attended the training programme and about 1000 persons attended to the mass awareness programme.

- The Mass Awareness Programme on rainwater harvesting and water management was conducted on 17.2.2006 at Govt. Senior Secondary School Panarsa. The Chief Guest to the programme was Sh. Kaul Singh Thakur, Hon'ble Minister (I&PH), Govt. of Himachal Pradesh. The function was attended by large gathering of school children and villagers and officers from Department of Agriculture. Lectures were delivered during the programme, focusing on the need for harvesting water for various uses and artificial recharge to groundwater for future use. The exhibition displaying roof top rain water harvesting models and other displays were arranged to aware the gathering on the theme. The function was attended by more than 1500 persons. Students from VI-XII actively participated in painting and debate competition on ground water during the programme.

- Water Management training programme on rainwater harvesting and water management was conducted on 23.12.2006 at Padhar. The Chief Guest to the programme was Sh. O.P.Chauhan, Superintending Enginner, I&PH. The training programme was attended by Junior Engineers, Assistant Engineers, Sub-divisional Engineers from the I&PH department. About 80 persons attended the training programme. Lectures and power point presentations were delivered by the Regional Director and scientists of CGWB, focusing on the need for harvesting water for various uses and artificial recharge to groundwater, including the case studies. The exhibition displaying roof top rain water harvesting models, various posters and other displays were arranged to aware the target group towards water conservation and adopting rain water harvesting.

Participation in Exhibition, Mela, Fair etc

CGWB in order to create the awareness, exhibited its models, posters, displays etc during mass awareness programmes and ground water management training programme conducted in the district.

Presentation & Lectures delivered in public forum / Radio/TV/Institution of repute/Grassroots association /NGO/Academic institutions etc

Presentation and lectures were delivered amongst the gathering during the MAP and WMTP conducted in the district.

8.0 AREAS NOTIFIED BY CGWA / SGWA

As per 2011 Ground Water Resource Estimation the stage of ground water development in Balh valley of Mandi district is 15.36% only and falls in "**safe category"**. Thus, no area or block has been notified from groundwater development point of view.

9.0 RECOMMENDATIONS

- In valley areas, in addition to traditional ground water structures like dug wells and springs, shallow to medium depth tube wells can be constructed for developing the ground water resource particularly in Balh valley.
- In hilly terrain, springs and perennial nallas are the major sources of water. Shallow to medium depth bore wells fitted with hand pumps are useful ground water structures for meeting the domestic needs and are feasible at favorable locations.
- Traditional resources like springs, need to be revived, developed & protected on scientific lines for various uses. The discharge of such springs, can be sustained by construction of small check dams or subsurface dykes across the nallahs/tributaries at favorable locations.
- Small ponds/tanks/talavs can be utilized for recharging ground water. These structures, can be constructed for harvesting water and utilizing for meeting the domestic needs.
- Roof top rainwater harvesting practices must 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 slopy, hilly and chronic water scarce areas. There is thus a need to create awareness for water conservation, 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 and it also damages the natural river systems.
- People's participation is a must for any type of developmental activity. 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 programmes.

SAVE WATER – SAVE LIFE

For Technical Assistance Relating to Rainwater Harvesting & Artificial Recharge to Ground Water

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