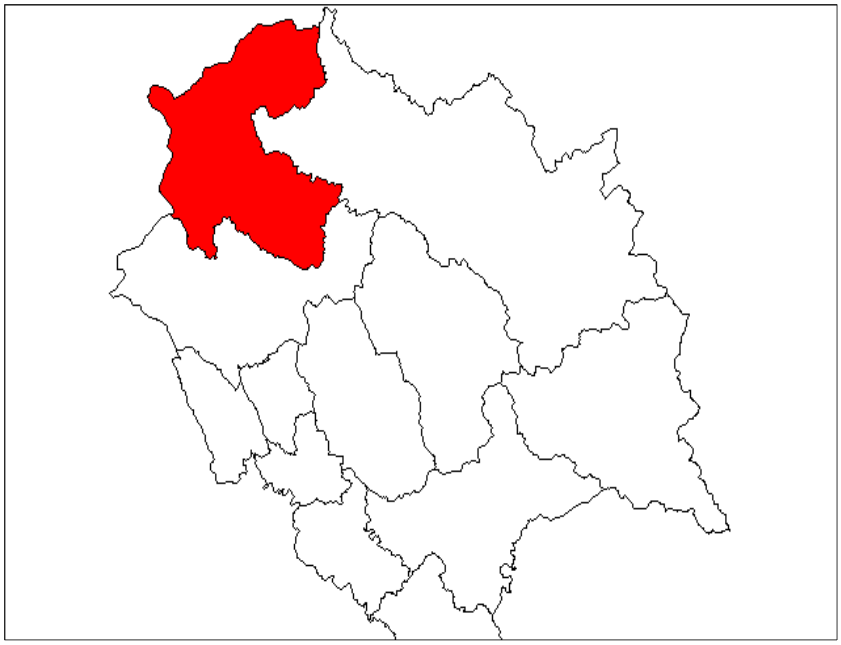
Government of India

Ministry Of Water Resources

CENTRAL GROUND WATER BOARD

GROUND WATER INFORMATION BOOKLET
CHAMBA DISTRICT, HIMACHAL PRADESH



NORTHERN HIMALAYAN REGION
DHARMSALA
2013

" जल संरक्षण वर्ष 2013 "

Contributors

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Prepared under the guidance of
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Head Of Office

Our Vision

Water security through
sound management

" जल संरक्षण वर्ष 2013 "

GROUND WATER INFORMATION BOOKLET
Chamba District, Himachal Pradesh

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" जल संरक्षण वर्ष 2013 "

CHAMBA DISTRICT AT A GLANCE

Sl. No	Items	Statistics
1.	**GENERAL INFORMATION**	
	i) Location	North latitude 32° 11’30’’- 33° 13’ 06’’ & East longitude 75° 49′ 00” - 77° 03’ 30″
	ii) Geographical area (sq km)	6,522
	iii) Administrative Divisions (2001)	
	a) Number of Tehsil + Sub-tehsils	7 + 3
	b) Number of CD Blocks	7
	c) Number of Villages	1591
	▪ Inhabited	1118
	▪ Un-inhabited	473
	iv) Population (as on 2011 Census)	5,19,080 persons
	a) Sex Ratio	986
	b) Urban Population	6.96 %
	c) Rural Population	93.04 %
	d) Schedule Caste	21.52 %
	e) Schedule Tribes	26.10 %
	v) Annual Rainfall 2012 (mm)	1106
2.	**GEOMORPHOLOGY**	
	Major Physiographic units	▪ Dissected Hills ▪ Valley fills
	Major Drainage basins	▪ Ravi, ▪ Beas ▪ Chenab
3.	**LAND USE** (ha.)	
	a) Forest area (2008-2009)	272000
	b) Total cropped area(2008-2009)	68400
4.	**MAJOR SOIL TYPES**	▪ Sandy Loam ▪ Loam ▪ Sandy Clay Loam

5. **AREA UNDER PRINCIPAL CROPS** (2008-09)

- Wheat: 20,776ha
- Rice: 2,674 ha
- Maize: 29,465 ha
- Pulses: 3,288 ha
- Barley: 4,042 ha
- Common millets: 1,233 ha

6. **IRRIGATION BY DIFFERENT SOURCES** (2008 – 2009)

Total Irrigated area by Tanks / Ponds / Canals/ other sources	3,545 hectare

7. **PREDOMINANT GEOLOGICAL FORMATIONS**

- Quaternary Alluvium, Tertiary (Siwaliks)
- Older Crystalline & Metamorphic rocks of Paleozoic to Triassic

8. **HYDROGEOLOGY**

Major Water bearing formations (valleys)	Valley fills/ Sediments
Major Ground Water Sources	Springs
Discharge	Seepage to > 4 lps
Major Water bearing formations	▪ Secondary Porosity in Paleozoic to Triassic rocks and

9. **GROUND WATER EXPLORATION BY CGWB** (as on 31.3.2013)

a) No of wells drilled	Nil
b) Depth Range (m)	-
c) Discharge (lps)	-
d) Transmissivity (m2/day)	-

10. **GROUND WATER QUALITY** — Nil

Presence of Chemical constituents more than permissible limits
(eg. EC, F, As, Fe)

11.	**DYNAMIC GROUND WATER RESOURCES (2011) in MCM**	Not estimated due to localized aquifers
	a) Annual Replenishable Ground Water Resources	-
	b) Net Annual Ground Water Draft	-
	c) Projected Demand for Domestic and industrial uses up to 2025	-
	d) Stage of Ground Water Development	-
12.	**EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING**	Nil
13.	**GROUND WATER CONTROL AND REGULATION**	
	a) Number of OE Blocks	Nil
	b) No of Critical Blocks	Nil
	c) No of blocks notified	Nil
14.	**MAJOR GROUND WATER PROBLEMS AND ISSUES**	Nil
15.	**AWARENESS AND TRAINING ACTIVITY**	

(Water Management and Training Programme)

	Venue	**Date**
1.	MAP on RWH & Spring Recharge at Bharmour	29th March 2012.
2.	Tier III Training Programme on Village Level Aquifer Management at Chuwari, Chamba	27-28th February,2013
3.	Tier III Training Programme on Village Level Aquifer Management at Sihunta, Chamba	1-2nd March, 2013

GROUND WATER INFORMATION BOOKLET
CHAMBA DISTRICT, HIMACHAL PRADESH

1.0 INTRODUCTION

The Chamba district in the present form came in to existence on 1st November 1966 which is bounded on north-west by Jammu and Kashmir, on the north-east and east by Ladakh area of Jammu and Kashmir state and Lahaul and Bara-Bangal area of Himachal Pradesh, on the south-east and south by the District Kangra of Himachal Pradesh and Gurdaspur District of Punjab. The district is Situated between north latitude 32° 11′ 30″ and 33° 13′ 06″, and east longitude 75° 49′ 00" and 77° 03′ 30″ .

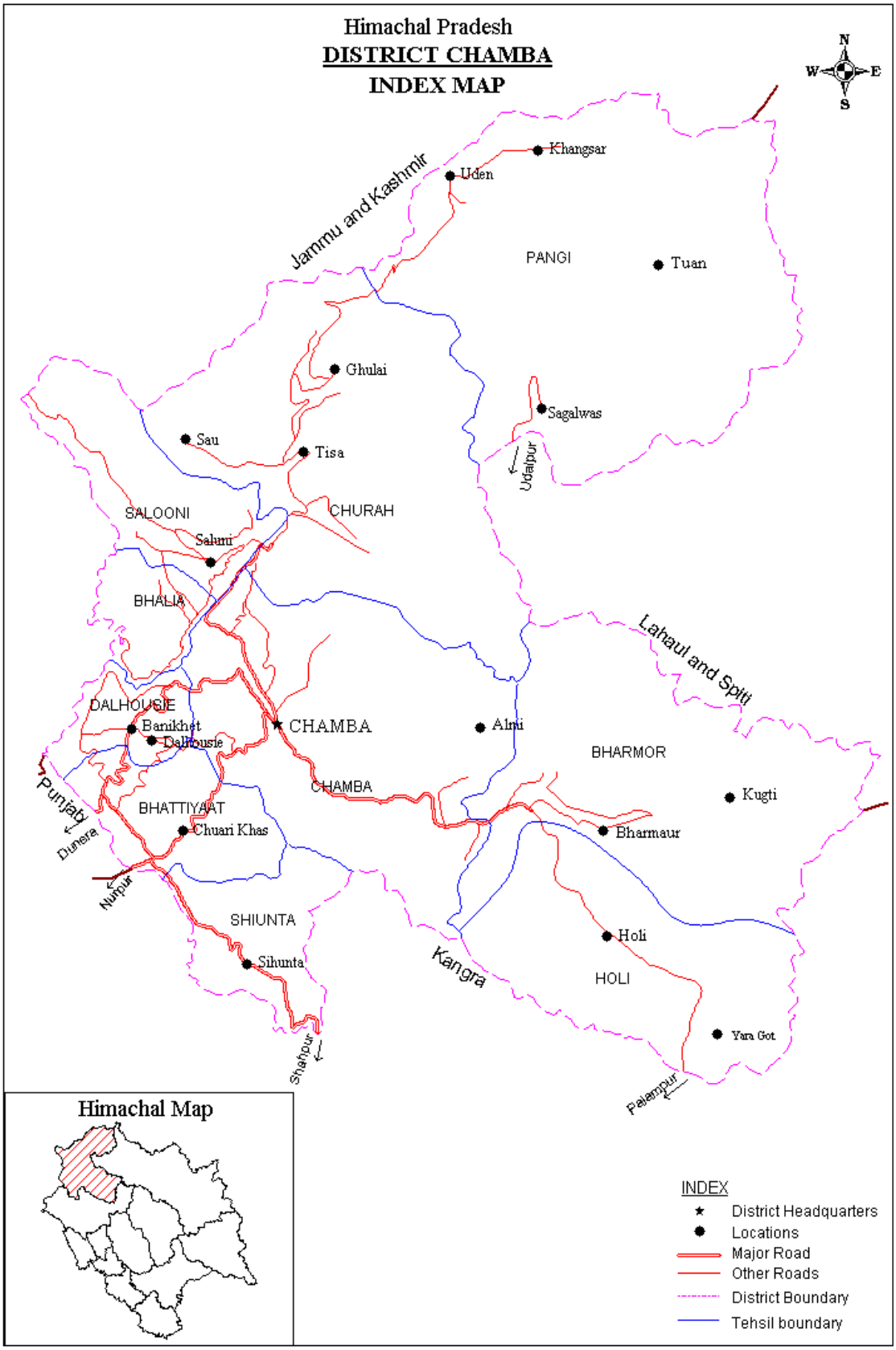
The area of the district is 6,522 sq. km with Chamba as its Headquarters. There are 1591 villages in the district. The district has been divided into 6 Sub-divisions [Chamba, Churah, Pangi, Bharmaur, Dalhousie, Chowari]. There are 7 tehsils [Chamba, Churah, Salooni, Pangi, Bharmaur, Dahlhousie, Bhatiyat] & 3 sub-tehsils [Bhallai, Holi, Sihunta]. Further, for development purposes the district has been subdivided in 7 CD blocks viz., Chamba, Mehla, Bharmour, Tissa, Salooni, Pangi, Bhatiyat.

As per 2011 census, the district has a population of 5,19,080 persons with density of population 80 person per sq km. The male and female population in the district is 2,61,320 and 2,57,760 respectively with a female/male sex ratio of 986 females per 1000 males. The schedule cast population in the district is 21.52% and the schedule tribe population is 26.10%.

The Ravi is the main river of Chamba district and is the heart and soul of the Chambyals. With its tributaries, it drains the whole of Chamba valley proper between Dhauladhar and Pangi range and thus commands the largest and most important part of the district. The river originates from Bara Bangahal area of Dhauladhar. The Main tributaries of Ravi are Budhil, Tundah, Beljedi, Sal, Siul, Siowa The river Chenab or Chandrabhaga rises from the mountains of Baralacha pass by two heads, the stream with its source on south-eastern side of the pass being called the Chandra and the other one which rises from north-western side is called the Bhaga. After the confluence of these two sister streams at Tandi, the river is generally known as Chenab.

There are no large-sized lakes in Chamba district. However, a few water bodies namely Khajjiar Lake, Manimahesh Lake, Chamera Lake, Lama Dal, Gadasru Lake, Maha Kali Dal exists**.**

The irrigation is mainly done either by tapping natural springs or by lifting surface water from perennial khads and rivers. Khul irrigation is prevalent in many valleys and an area of 3,545 hectare is brought under irrigation by tapping natural springs and by lift irrigation schemes.


Himachal Pradesh
DISTRICT CHAMBA
INDEX MAP
N
W
E
S
Jammu and Kashmir
Khangsar
Uden
PANGI
Tuan
Ghulai
Sagalwas
Udaipur
Sau
Tisa
SALOONI
CHURAH
Saluni
BHALAI
Lahaul and Spiti
DALHOUSIE
Banikhet
Dalhousie
CHAMBA
Alni
BHARMOR
Kugti
Punjab
Dunera
BHATTIYAAT
Chuari Khas
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Nurpur
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Himachal Map
INDEX
District Headquarters
Locations
Major Road
Other Roads
District Boundary
Tehsil boundary

2.0 CLIMATE & RAINFALL

The climate of the district varies from semi-tropical to semi-arctic. Winter varies from December to February and summer extends from March to June while July to September are rainy months. The maximum rainfall in the district occurs between July to September. The rainfall in the district during 2012 was 1106 mm. Snowfall is received in the higher reaches.

The minimum and maximum temperature at Saloni in 2011 was 1.1°C and 32.9°C in January and May respectively.

3.0 GEOMORPHOLOGY & SOIL TYPES

Chamba district presents an intricate mosaic of mountain ranges, hills and valleys. It is primarily a hilly district with altitudes ranging from 600 m amsl to 6400 m amsl. Physiographically the area forms part of middle Himalayas with high peaks ranging in height from 3000 to 6000 m amsl. It is a region of complex folding, which has under gone many orogeneses. The topography of the area is rugged with high mountains and deep dissected by river Ravi and its tributaries. Physiographically the district can be divided in to two units-*viz.*

(i) high hills, which cover almost entire district
(ii) few valley fills.

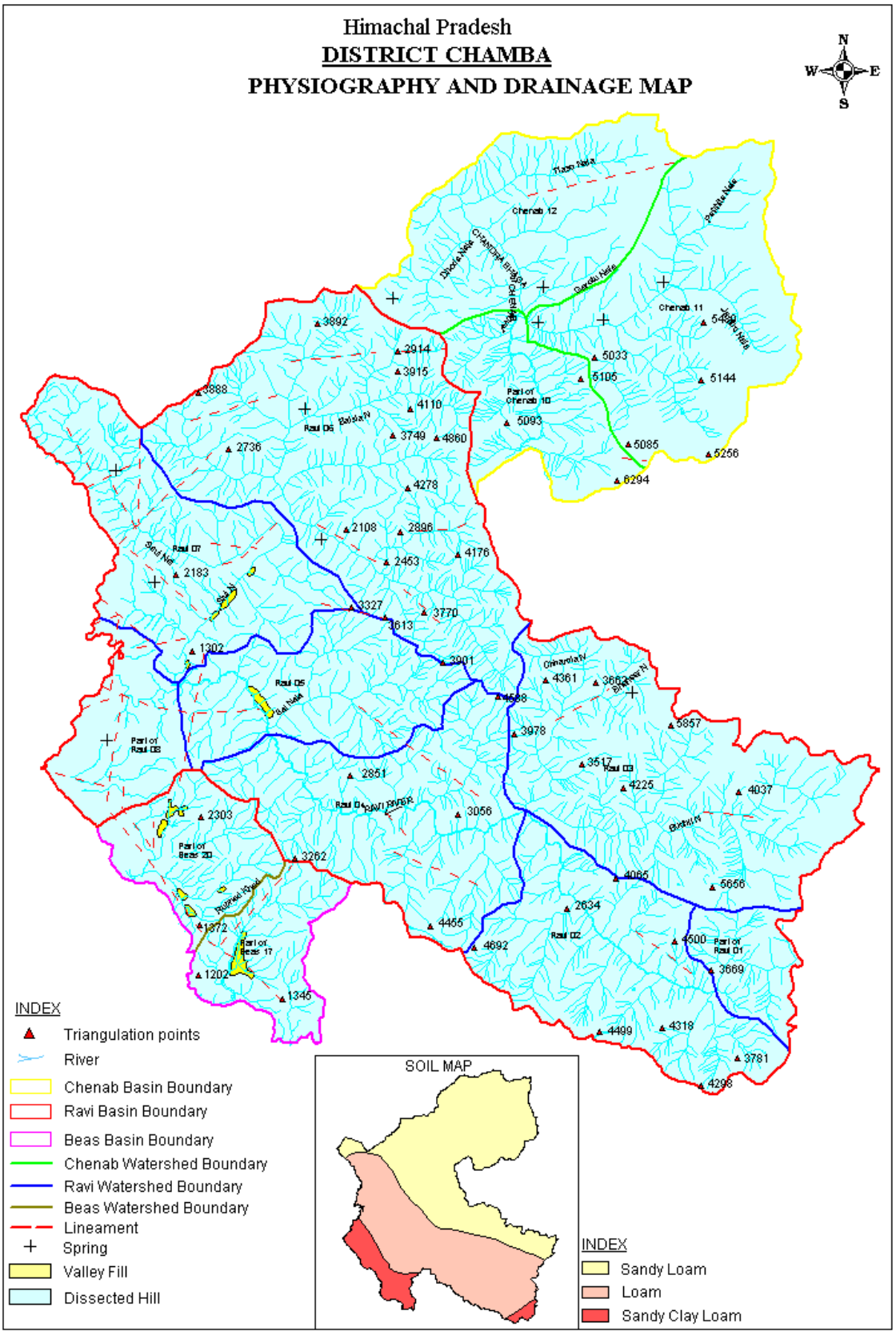
Three types of soils observed in the district are 1. Sandy Loam 2. Loam 3. Sandy Clay Loam.

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
Pleistocene	Upper Siwaliks	Boulder conglomerate, Sandstone
Pliocene	Middle Siwaliks	Sandstone, gravel beds, clays etc.
Miocene	Lower Siwaliks	Shales, Hard Sandstone etc.
Triassic	Kalhel formation	Light and dark grey limestone with banks of phyllite and slate
Permian	Salooni formation	Inter bedded phyllite, light and dark grey limestone, phyllite, black carbonaceous slate with schistose quartzite and chert band
Carboniferous	Manzir formation	Pebbly phyllite, grey green slate with limestone
Lower to Middle Paleozoic	Dalhousie/ Dhauladhar formation	Granite and granite gneiss
Lower Paleozoic	Chamba formation	Meta siltstones, greywackes, slates and phyllites.


Himachal Pradesh
DISTRICT CHAMBA
PHYSIOGRAPHY AND DRAINAGE MAP
N
W
E
S
Chenab 12
Chenab 11
Chenab 10
Ravi D6
Ravi D7
Ravi D5
Ravi D4
Ravi D3
Ravi D2
Ravi D1
Part of Ravi D8
Part of Beas 20
Part of Beas 17
3892
2914
3915
3888
4110
2736
3749
4860
5033
5105
5144
5093
5085
5256
6294
4278
2108
2896
4176
2453
2183
3327
3770
3613
1302
3901
4361
4588
3978
5857
3517
4225
4037
2851
3056
2303
3262
1372
1202
1345
4455
4692
2634
4065
5656
4500
3669
4499
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3781
4298
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Triangulation points
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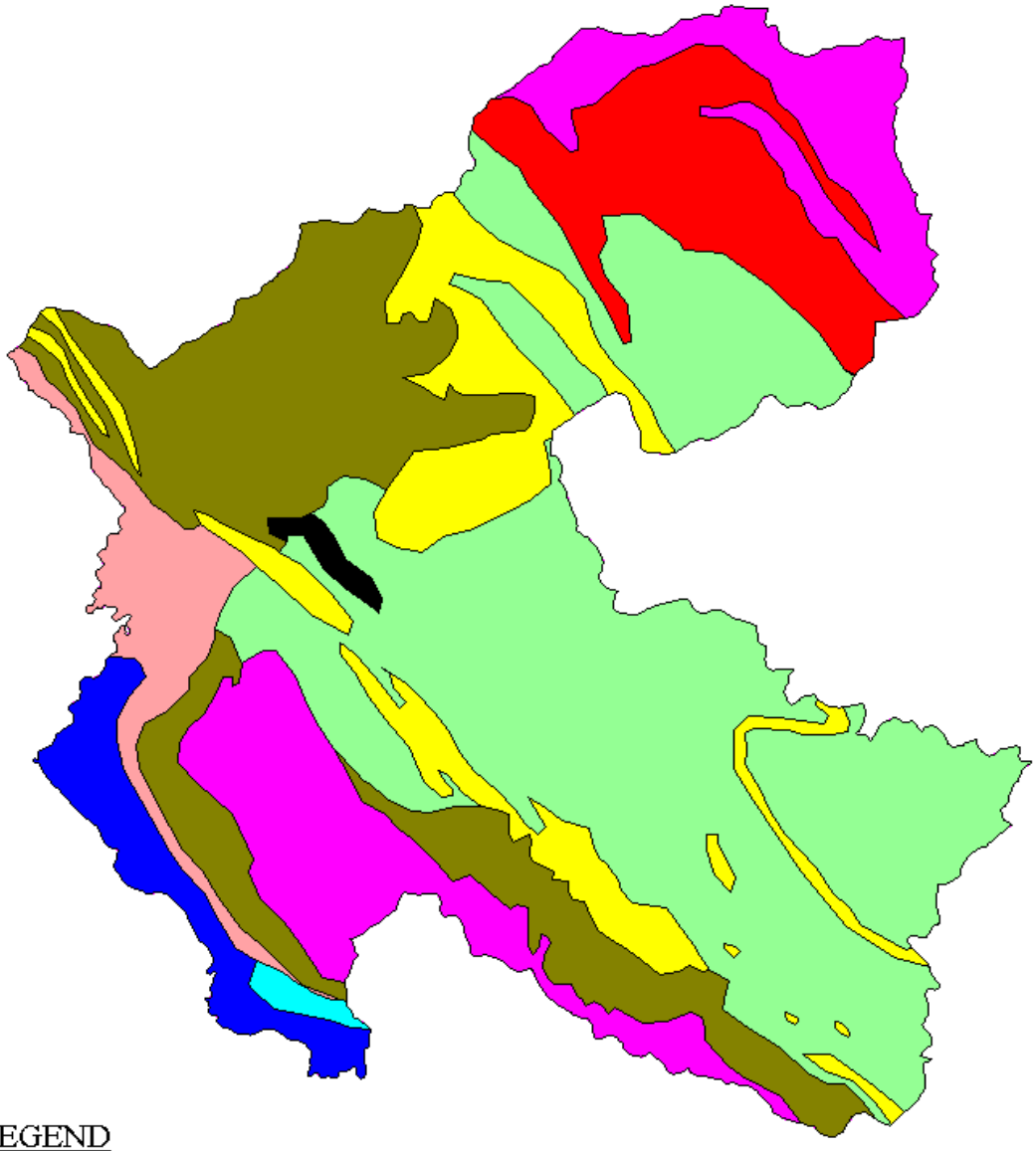
Sandy Loam
Loam
Sandy Clay Loam

Himachal Pradesh

DISTRICT CHAMBA

GEOLOGY MAP



LEGEND

AGE	FORMATION	LITHOLOGY
Middle Miocene to Lower Pliestocene	Siwaliks	Conglomerate Sandstone Shale and Clay
Lower Miocene to Middle Miocene	Murree / Dagshai / Kasauli and Dharamshala Formation	Sandstone Clay and Shale
Triassic	Quartzite Beds / Manatis Shale / Coral Limestone / Krol Formation	Shale Slate Quartzite Limestone and Schist
Permian	Kuling / Salooni Formation	Limestone, Slate and Quartzite
Carboniferous	Lipak / Manjir / Blaini Formation	Conglomerate Quartzite Limestone Slate Boulder bed Limestone
Pre-Cambrian to Devonian	Jutogh / Simla Group / Rampur Group	Phyllite, Slate Quartzite
Pre-Cambrian	Jutogh / Vaikrita / Central Crystic / Older Formations / Chamba Formation / Chail	Slate Phyllite Quartzite Sandstone Schist and Granite Gneiss
Age not known	Chor / Dalhousie / Ruhi / Bundal Granite Gneiss and Equivalent	Granite
Pre-Cambrian Intrusives	Mandi / Dutla / Manikaran volcanic	Basic Volcanic Rocks

Most part of the area is underlain by hard rock formation ranging in age from Paleozoic to Triassic. These older rocks are devoid of any primary porosity. Ground water movement in these rocks takes place through joints, fractures and other structural features like schistose plane etc. In the younger rocks of Tertiary age and in terrace deposits along the major rivers and khads, pore spaces between sand gravel and tallus material also form the avenues for ground water movement.

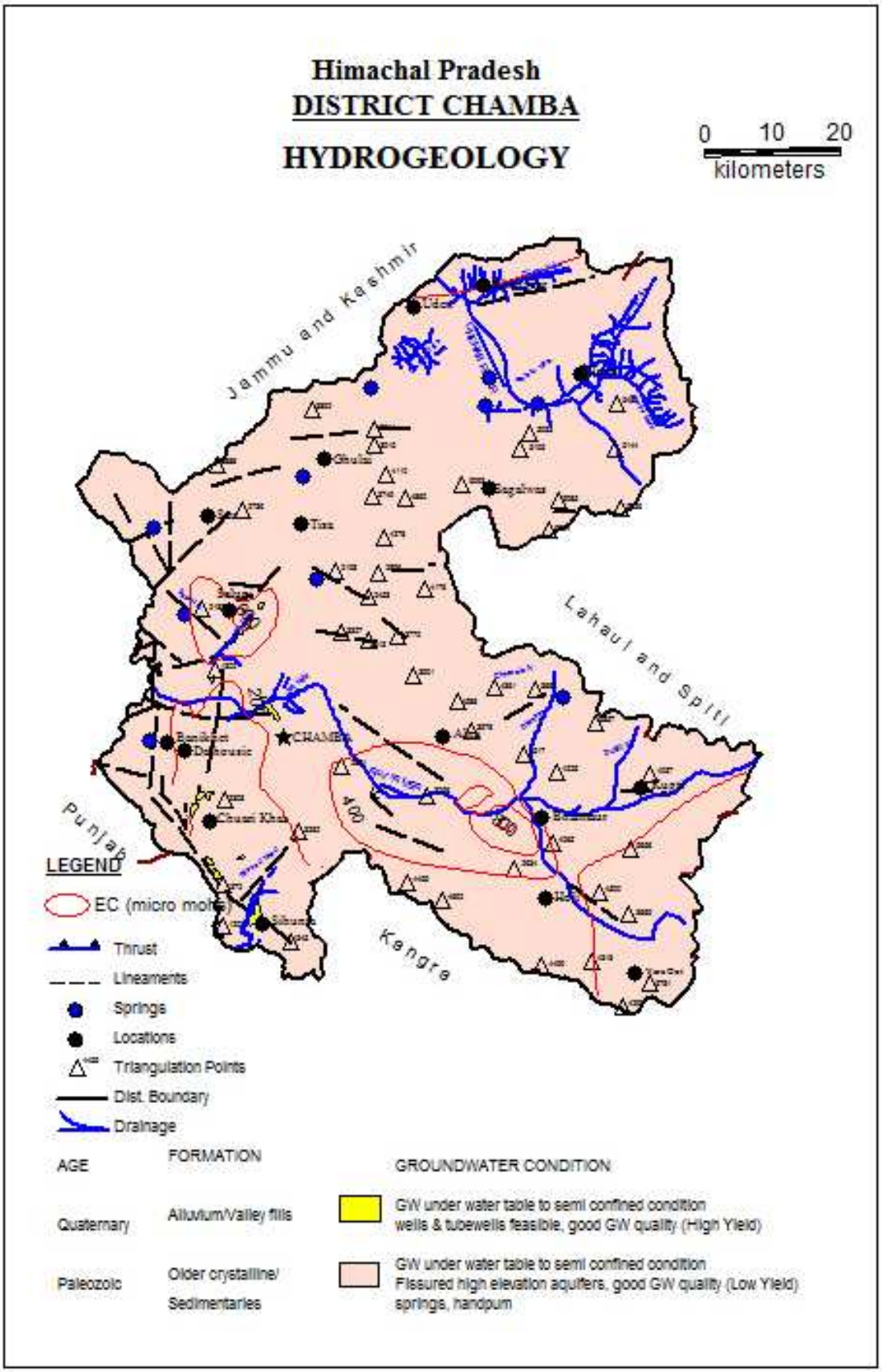
Due to steep rising hills with intervening dissected valleys together with the consolidated nature and disposition of rock disposition of rock formation leads to conclusion that no ground water reservoir of any appreciable magnitude within the hill region exists. Whatever quantity of water this mountainous terrain receives through rainfall and snowfall soon tends to flow down to lower level due to steep slopes and the water goes out of the areas through a dense network of streams nallahs. However, a part of the water percolates into the underlying formations during this process. This water moves underground due to gravitational force and at favourable points it emerges as springs on down slopes. During the course of survey it was also noticed that with the advent of dry season springs located on downstream side i.e. on lower level dry out later then those located on upstream side. The concentration of springs was found more along the rivers and khads. Usually the springs contribute water to the base flow of these khads and rivers, which in turn is utilized at favourable places for irrigation and domestic purposes.

Ground water generally occurs under unconfined to semi-confined conditions. State Irrigation and Public Health Department has drilled handpumps fitted with the motors somewhere. The average depth of these handpumps varies from 35.00 to 70.12 m bgl. Average depth to water level varies from 10 m bgl to 30 mbgl with variable discharges ranging from .25 to .75 lps. Water table follows the topography and the formations encountered are localised valley fill deposits consisting of sand, gravels, pebbles & cobbles.

4.2 Ground Water Resources

Snowfall / rainfall is the major source of groundwater recharge apart from the influent seepage from the rivers and inflow from upland areas whereas discharge from ground water mainly takes place from effluent seepages of ground water in the form of springs and base flow in streams etc.

The district has a hilly terrain having very high slopes. The valley areas are deep, narrow and isolated. The areas therefore not considered for estimation of the ground water resources due to their discontinuous aquifer systems.


Himachal Pradesh
DISTRICT CHAMBA
HYDROGEOLOGY
0 10 20
kilometers
Jammu and Kashmir
Lahaul and Spiti
Punjab
Kangra
CHAMBA
LEGEND
EC (micro mohs)
Thrust
Lineaments
Springs
Locations
Triangulation Points
Dist. Boundary
Drainage
AGE
FORMATION
GROUNDWATER CONDITION
Quaternary
Alluvium/Valley fills
GW under water table to semi confined condition
wells & tubewells feasible, good GW quality (High Yield)
Paleozoic
Older crystalline/
Sedimentaries
GW under water table to semi confined condition
Fissured high elevation aquifers, good GW quality (Low Yield)
springs, handpum

4.3 Ground Water Quality

National Hydrograph Network Stations has not been established in the district so far. However, the water samples collected from various sources like spring and handpumps during the various hydrogeological studies revels that the overall ground water quality is good and is suitable for all type of uses.

4.4 Status of Ground Water Development

The district is full of perennial springs. They differ considerably in their discharges. By and large these springs are used for domestic, livestock and irrigation purpose.

For domestic purpose water has been drawn at source where ready arrangement exist for filling containers or elsewhere water channels have been dug to carry water from springhead to the village concerned. With the progress of development, pipelines are increasingly laid down, thus improving the convenience and efficient water supply.

The drinking water supply for Chamba town is met with mainly from two nallahs viz., Sarotha and sal nallah.

The Dalhousie town is situated at an average height of 2200 m amsl. The main source of water supply for the town is from Ahla Khad, Dain Khad and Panjpulla. During summer season the requirement is more and the supply is less as discharge of the khads dwindles.

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. 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 small depth wells fitted with handpumps in these areas. High hill ranges occupy more than 95 % of the area of the district. During the very past years, the traditional ground water source has served the settlements. Ground water development on small scale is seen in the valleys areas particularly in the Chamba town. Handpumps have been installed in these areas and are energized for the water supply. There exists a scope to explore the potentialities of rest of the areas for ground water in low lying

valley areas. The 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 springs and hand pumps are the major sources of water supply, but the availability of water during summer is limited particularly in lean periods and requires immediate attention to augment the ground water resource. Based upon the climatic conditions, topography, hydrogeology of the area, suitable structure for rain water harvesting and artificial recharge to ground water are required. 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 / snow harvesting structures can be adopted.

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

The entire district is hilly and mountainous and comes under the rain shadow area of Himalaya. 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 district.

Most of the ground water issues and problems in the district are localized and need to be treated independently by taking micro level studies in a particular area.

7.0 AWARENESS & TRAINING ACTIVITY

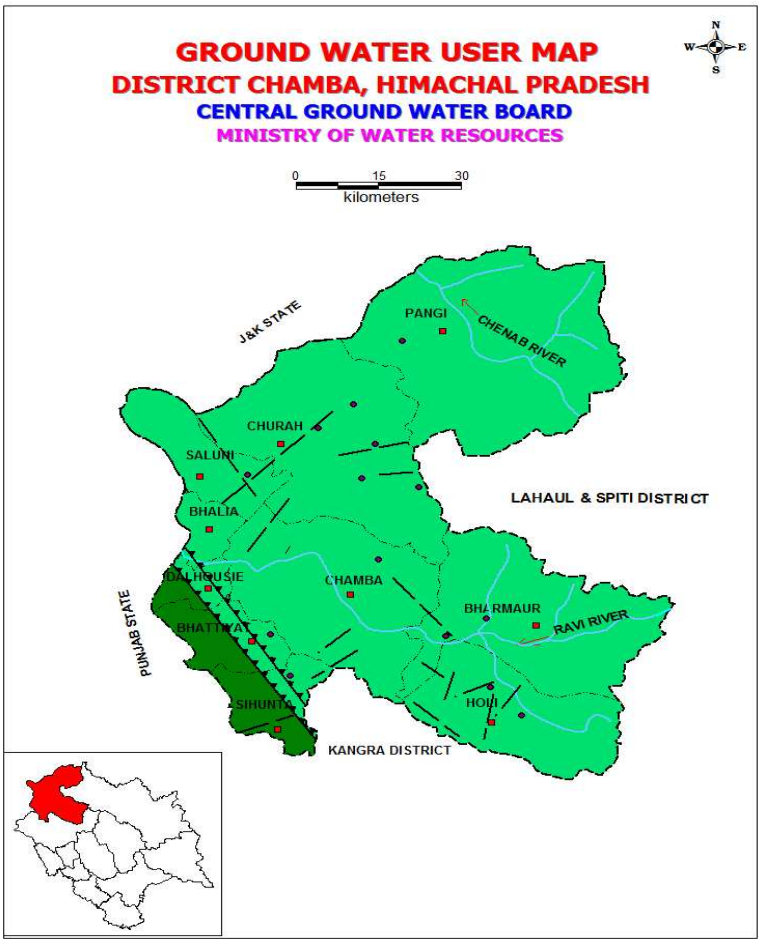
Mass Awareness Programme (MAP) & Water Management Training Programme (WMTP) by CGWB

S.NO	VENUE	DATE
WATER MANAGEMENT TRAINING PROGRAMME		
1.	MAP on Rain Water Harvesting & Spring recharge, Bharmour	29.03.2012
2.	Tier III Training Programme on Village level Aquifer Management Plan at Chowari	27 & 28.02.2013
3.	Tier III Training Programme on Village level Aquifer Management Plan at Sihunta	01 & 02.03.2013

So far, three numbers of MAP & Training Programmes have been organized at Bharmour, Chowari and Sihunta of Disrtict Chamba. More than 180 participants were there to attend the programme from various villages. Gathering was basically of ground water users in villages, in one form or other. Farmers and user groups from Mid Himalayan Water Shed Development Project were also present. Officers and officials of IPH and Mid Himalayan Water Shed Development Project attended the function. Famous Environmentalist put stress on ground water in relation to environment. 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 model and other displays were arranged to aware the gathering on the theme.

8.0 AREAS NOTIFIED BY CGWA / SGWA

None of the areas of the district are notified by CGWA / SGWA.



	Wells feasible	Rigs suitable	Depth of Well (m)	Discharge (lpm)	Suitable artificial Recharge structures
Soft rock aquifers	Tube well Dug well	DTH with Odex 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 Mannual	100-200 10-20	1000-2000 300-500 30-2000	
Thrust			Fault/lineament		
Major drainage Spring			Tehsil boundary District boundary		

9.0 RECOMMENDATIONS

- In valley areas, in addition to traditional ground water structures like springs, shallow to medium depth tube 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 favourable locations.
- Traditional sources 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 nallas/tributaries at favourable locations.
- Small ponds/tanks/talabs can be utilized for recharging ground water. These structures can be constructed for harvesting water and utilizing for domestic needs.
- Snow water harvesting practices can be adopted in hilly areas since the district receives ample snowfall.
- There is need to create awareness for water conservation, augmentation and proper waste disposal for protecting water sources

SAVE WATER – SAVE LIFE

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

Contact:

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SAVE WATER SERVE HUMANITY