जल वर्ष 2007 Water Year 2007

स्वच्छ सुरक्षित जल – सुन्दर खुशहाल कल

CONSERVE WATER - SAVE LIFE

Government of India
Ministry of Water Resources
CENTRAL GROUND WATER BOARD

GROUND WATER INFORMATION BOOKLET
SIMLA DISTRICT, HIMACHAL PRADESH

NORTHERN HIMALAYAN REGION
DHARMSALA
2008

Contributors

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Regional Director Incharge

Our Vision

Water security through sound groundwater management

Ground Water Information Booklet
Simla District, Himachal Pradesh

CONTENTS

SHIMLA DISTRICT AT A GLANCE

Sl. No	*ITEMS*	Statistics
1.	GENERAL INFORMATION	
	i) Geographical area (sq km)	5131
	ii) Administrative Divisions (2001)	
	• Number of Tehsil & sub-tehsils	12 & 5
	• Number of CD Blocks	9
	• Number of Panchayats	337
	• Number of Villages	2914
	iii) Population (2001 Census)	722502
	• Population Density (pers/sq km)	141
	• Rural & Urban Population (%)	77 & 23
	• SC & ST Population (in percent)	26 & 0.60
	• Sex Ratio (F:M)	896: 1000
	iv) Average Annual Rainfall (mm)	1180
2.	GEOMORPHOLOGY	
	Major Physiographic units	• High structural hills & mountains with intermountain valleys (elevation 1600-3000) Deep Valley and gorges (elevation 600-900 m asl)
	Major Drainages	
	• Satjuj basin	Sutlej, Giri, Pabbar
	• Yamuna basin	
	• Pabbar basin	
3.	LAND USE (sq km)	
	• Forest area	1285
	• Cultivable area	791
	• Net area sown	692.73
4.	MAJOR SOIL TYPES	• Brown hill soil • Alpine Humus Mountain skeletal soil
5.	AREA UNDER PRINCIPAL CROPS (2005-2006) in sq km	
	• Rice	23.68
	• Wheat	160.82
	• Maize	136.42
	• Barley	44.70
	• Pulses	50.19

6.	IRRIGATED AREA (MI census 2000-2001) in Ha.	
	Net area irrigated (Surface water)	3403
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.3.2007)	
	• Number of Dug Wells	Nil
	• Number of Piezometers	Nil
8.	PREDOMINANT GEOLOGICAL FORMATIONS	
		• Alluvium/valley-fill (Quaternary) • Meta-sediments/ crystalline (Proterozoic)
9.	HYDROGEOLOGY	
	Major Water Bearing Formations	
	1. *Semi consolidated & consolidated (Tertiary & Older rocks)*	Covers Hilly, Mountainous part
	• Yield prospects	Generally Low (1-5 lps), >15 in favorable location.
	• GW structures	Springs, shallow bore wells
10	GROUND WATER EXPLORATION BY CGWB (as on 31.3.2007)	
	• No of wells drilled	1 (EW)
	• Depth (m bgl)	302
	• Discharge (lpm)	1173
	• Static Water Level (mbgl)	1.26
	• Transmissivity (m^2/day)	70.39
11.	GROUND WATER QUALITY	
	Presence of Chemical constituents more than permissible limits (eg. EC, F, As, Fe)	Nil
	Quality of Ground Water	Good
12.	AWARENESS AND TRAINING ACTIVITY	
	• Mass Awareness Programmes	Nil
13.	EFFORTS OF ARTIFICIAL RECHARGE & RAINWATER HARVESTING	
	Projects completed by CGWB	Nil
	Technical guidance to NGOs for roof top	Nil

rain water harvesting structures.

15. GROUND WATER CONTROL AND REGULATION

• Number of OE & Critical Blocks	Nil
• No of blocks notified	Nil

16. MAJOR GROUND WATER PROBLEMS AND ISSUES

• Hilly/Mountainous area	Forms runoff zone; Mostly hard rocks, low yield in favorable location; Springs & natural sources vulnerable to pollution due to unchecked sewerage dumps.

DISTRICT GROUND WATER BOOKLET
SIMLA DISTRICT, HIMACHAL PRADESH

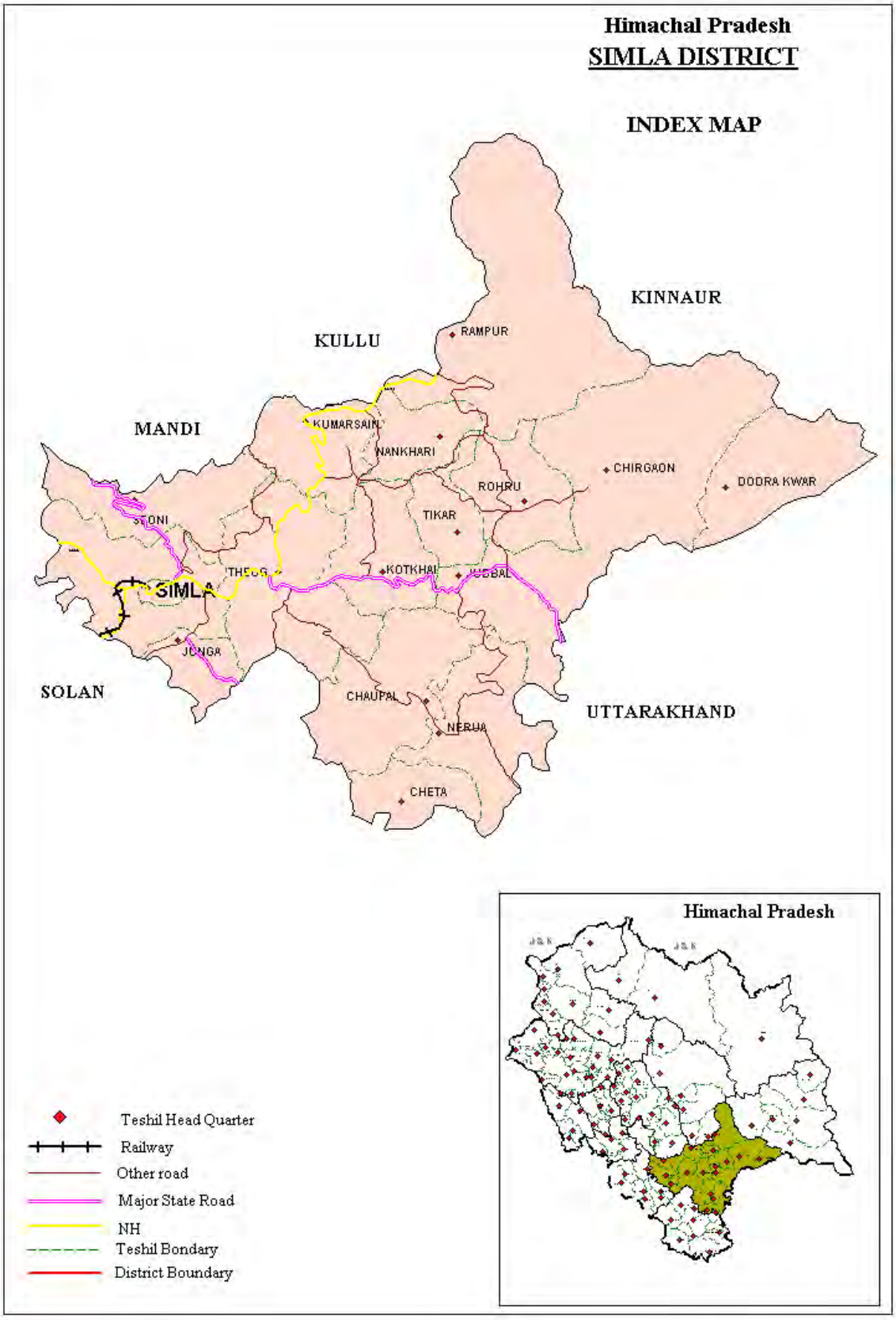
1.0 INTRODUCTION

Simla is one of the South-eastern districts of Himachal Pradesh State having geographical area of 5,131 sq.kms. The district lies between North latitude 30º45'48" to 30º43'0"and East longitude 76º59'22" to 78º18'40" and is covered by Survey of India degree-sheets 53A, 53E, 53F and 53I. The district is bounded by Mandi and Kullu in North, Kinnaur in the North-east, Sirmaur district and Solan District in the South and West respectively. District has inter-state boundary in the South - East with State of Uttrakhand. The district is well connected by rail and road network. The nearest airports are at Shimla (Jubbal Hatti) and Chandigarh.

Administratively, Simla town is the Capital of the Himachal Pradesh State and head quarter of the Simla district. The district comprises of 7 sub-divisions viz., Shimla urban, Simla rural, Theog, Rampur, Chopal, Rohru and Dodra Kawar and has 12 Tehsils (Shimla urban, Simla rural, Suni, Theog, Kotkhai, Rampur, Kumarsain, Chopal Rohru, Jubbal, Chirgaon, and Dodra Kawar) & 5 sub-tehsils (Junga, Nankhari, Nerwa, Cheta (Kupwi) and Tikkar). For development purpose district has been divided in to nine Community Development blocks viz., Mashobra, Theog, narkanda, Rampur, Jubbal, Rohru, Chhohara, Chopal and Basantpur, 331 gram panchayats, 2895 inhabited villages, 257 Patwar Circles and 32 Kanungo circles. Important towns in the district are Rampur, Rohru, Jubbal, kothai, Chopal, Kumarsain, Theog, Shimla, Kasumpti etc.

The population of the district is 7,22,502 (2001 census), of which 3,80,996 (53 %) males, 3,41,506 (47 %) female, sex ratio (F:M) is 896: 1000 and density of population is 147 per sq km. The rural & urban population is 5,55,269 (77 %) & 1,67,233 (23 %) respectively. The schedule caste and schedule tribes population in the district is 26% & 0.60 % respectively.

The local inhabitants mainly depend on agriculture for their subsistence and adopt several traditional practices conducive for farming in sloping terrains. Since Shimla is the state capital, it became a burgeoning city with multifarious activities like trade, commerce, tourism, education, health


Himachal Pradesh
SIMLA DISTRICT
INDEX MAP
KINNAUR
KULLU
RAMPUR
MANDI
KUMARSAIN
NANKHARI
CHIRGAON
DODRA KWAR
ROHRU
TIKAR
KOTKHAI
JUBBAL
SIMLA
JUNGA
SOLAN
CHAUPAL
NERUA
UTTARAKHAND
CHETA
Himachal Pradesh
Teshil Head Quarter
Railway
Other road
Major State Road
NH
Teshil Bondary
District Boundary

institution, Govt. offices, infrastructure, traffic and transportation. Large and small scale industrial development however has taken place randomly all over the district.

Central Ground Water Board (CGWB) has carried out Hydro-geological studies and Ground Water Exploration in the district. Hydrogeological studies commenced in sixties, and under exploratory drilling programme 1 exploratory well of depth 302 m has been drilled in hard rock hilly terrain. Further, CGWB under Ground Water Authority has carried out many Short-term investigations to find the feasible location for ground water development and management.

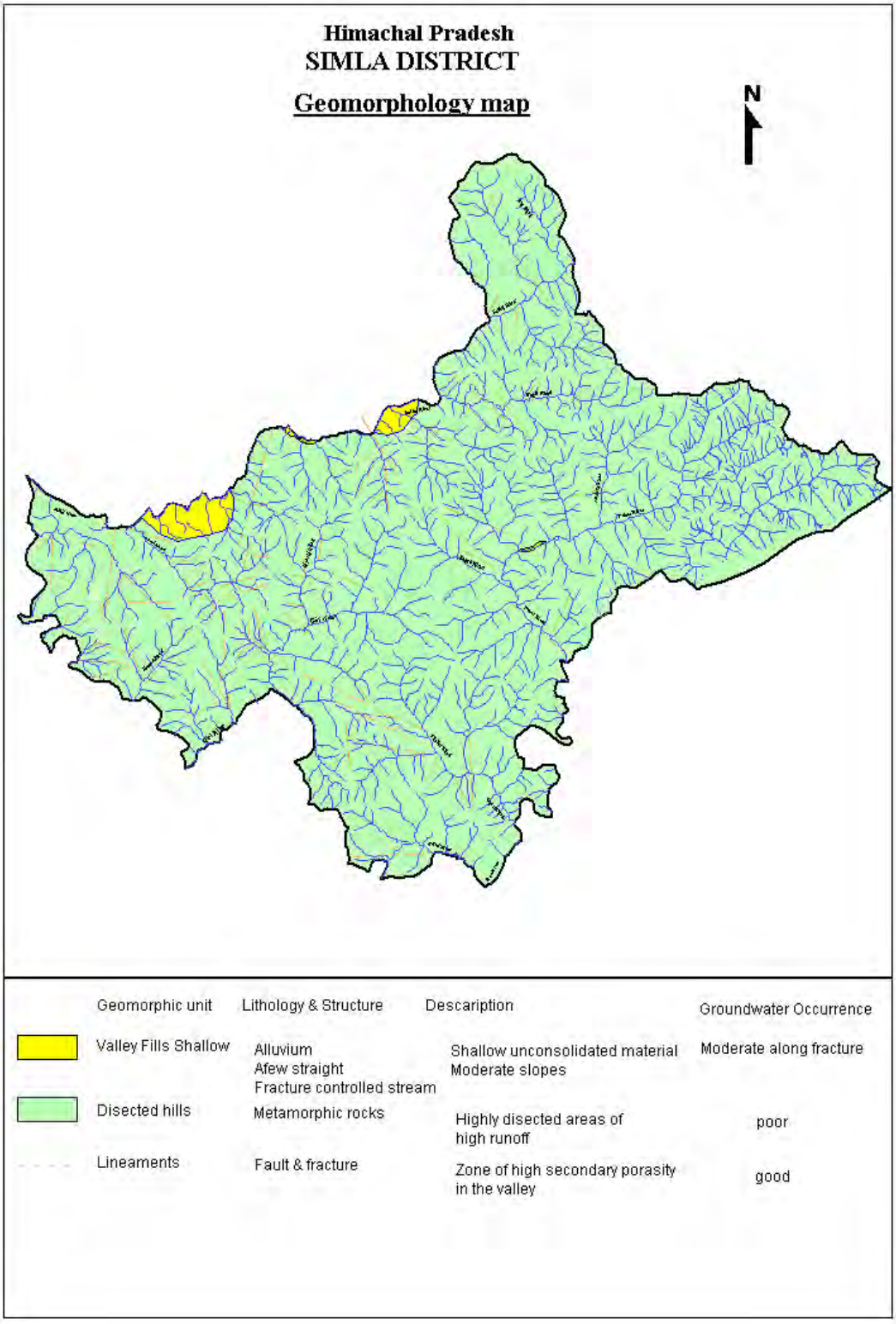
2.0 CLIMATE & RAINFALL

The climate of the district is sub-tropical in the valley and tends to be temperate in the hilltops. There are four major seasons. The winter season commences from Oct to Feb & ends in march; summer season extends from March to June followed by the monsoon period extending from July to September. Maximum precipitation occurs during the months from July to September. Average annual rainfall in the district is about 1253 mm. In the winter season precipitation as snowfall also occurs in the higher reaches and as rainfall in low hills and valleys of the district. Mean maximum and minimum temperature ranges between 33.3°C and –3.1°C. Shimla is on the map of international tourist centers on account of its being hill station with salubrious climate and extraordinary natural and scenic landscapes.

3.0 GEOMORPHOLOGY & SOILS

Simla district presents an intricate mosaic of high mountain ranges, hills and narrow deep valleys with altitude ranging from 1000 to 3000 m above MSL. In the areas underlain by high hill ranges of Himalayas, the valleys are narrow and deep with steep slopes trending in NW-SE direction. The terrain is moderately to highly dissected with steep slopes. The altitude is higher in northeastern parts and decreases towards south and west

Simla district is drained by streams/rivers forming part of the drainage basins of the Sutluj, the Yamuna, the Pabbar and Tons rivers. However,


Himachal Pradesh
SIMLA DISTRICT
Geomorphology map
N
Geomorphic unit
Lithology & Structure
Descaription
Groundwater Occurrence
Valley Fills Shallow
Alluvium
Afew straight
Fracture controlled stream
Shallow unconsolidated material
Moderate slopes
Moderate along fracture
Disected hills
Metamorphic rocks
Highly disected areas of high runoff
poor
Lineaments
Fault & fracture
Zone of high secondary porasity in the valley
good

major part of the district is drained by tributaries of Sutluj river viz., The Sutlej river is the longest river traversing along the northern boundary of the area and Giri river which is the tributary of the Yamuna river originate from the eastern part and runs in the SW direction. Whereas tributaries of Tons river flows in the southern parts and the Pabbar river in the eastern parts of the district. In general the density of drainage is moderate to high and is not uniform all over the district.

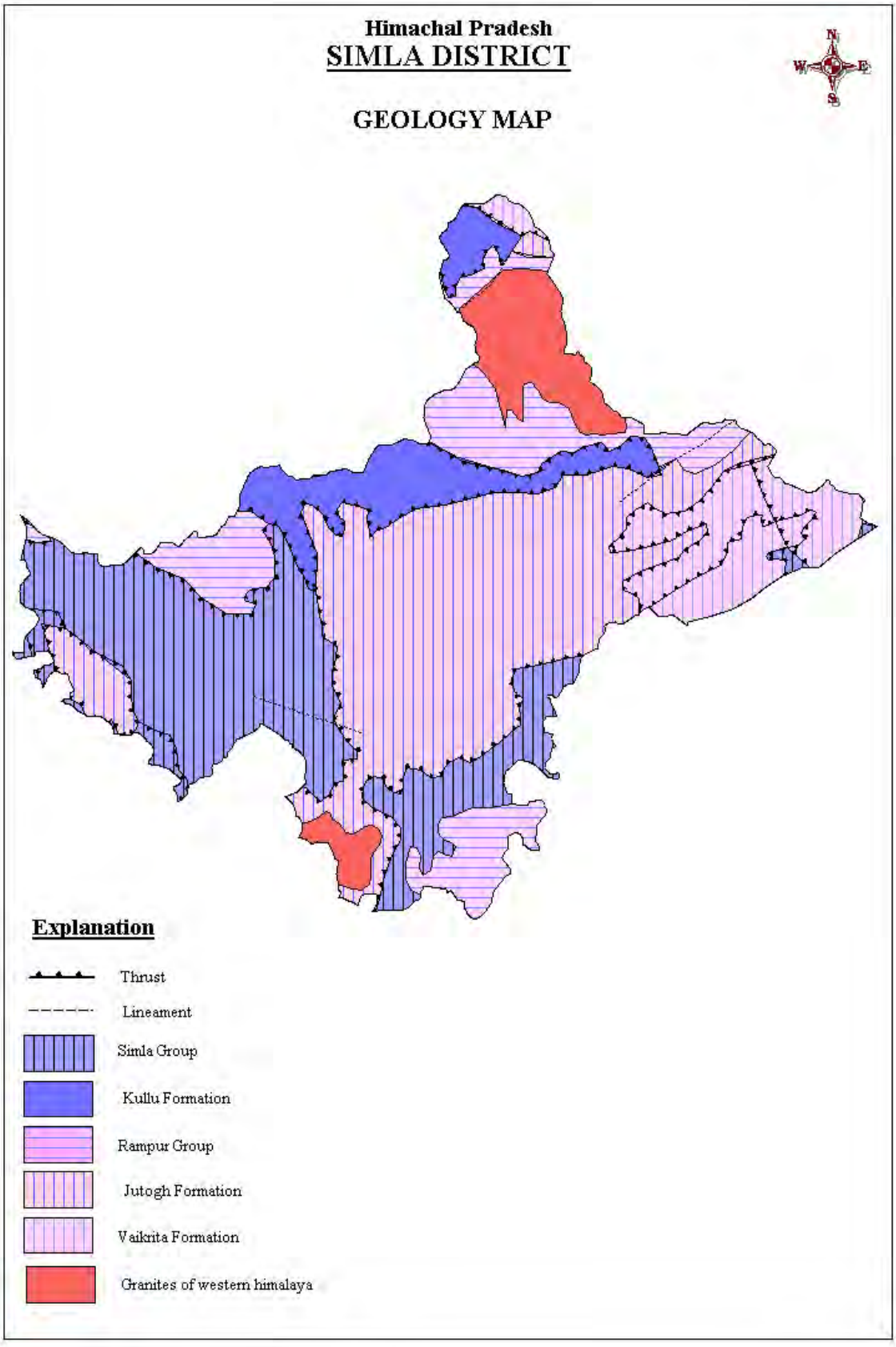
Soil is generally sandy loam in valley areas of the district and in rest of the hilly and mountainous areas soil is skeletal, soil depth is generally shallow except in areas having good vegetative cover. It is generally dry, shallow and deficient in organic matter. Landslides are the common features in mountainous terrain. Soils are rich in nutrients and thus are fertile

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

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

Era	*Period*	*Formation*	*Lithology*
Quaternary	Recent	Alluvium	Sand with pebble and clay, medium to coarse grained sand with pebble of sandstone and lenses of clay
Proterozoic	Neoproterozoic	Simla group	Siltstone, greywacke, sandstone, quartzite, conglomerate, Shale, slate, Phyllite, dolomite and meta-volcanics
		Kulu group	Schist, quartzite, banded gneiss, carbonaceous slate, limestone etc.
		Rampur group	Phyllite, schist, quartzite, dolomite, and basic flows
		Jutogh	Shale, phyllite, schist, staurolite quartzite, dolomite, Limestone, and amphibolite
	Mesoproterozoic	Vaikrita Group	Biotite schist with kyanite, gneiss and migmatites
	Palaeoproterozoic	Granite of Himalayas	Granites


Himachal Pradesh
SIMLA DISTRICT
GEOLOGY MAP
N
W
E
S
Explanation
Thrust
Lineament
Simla Group
Kullu Formation
Rampur Group
Jutogh Formation
Vaikrita Formation
Granites of western himalaya

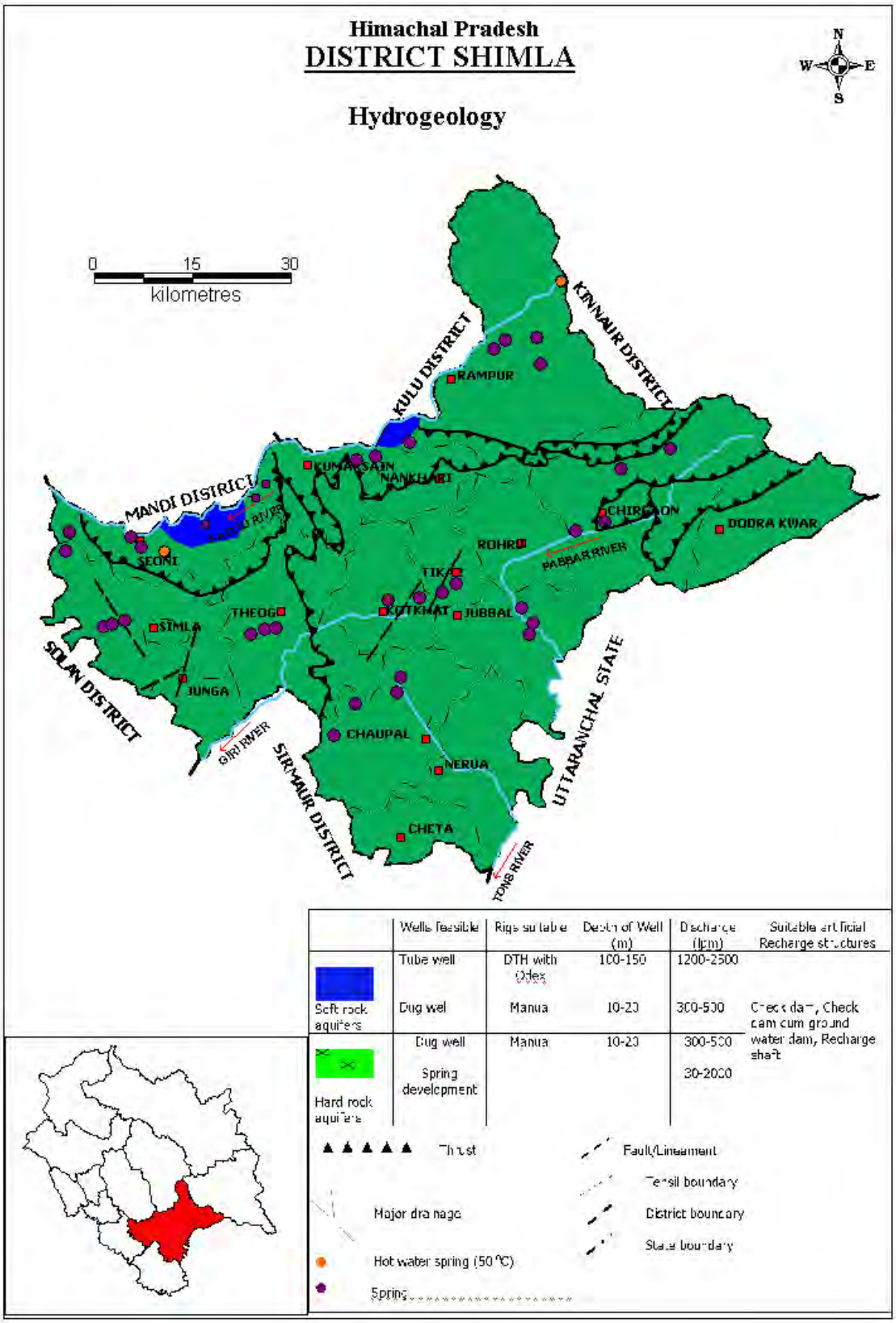
A perusal of the geological map, shows that most part of the area is underlain by hard rock formation ranging in age from Archaean to Devonin. These older rocks are devoid of any primary porosity. Secondary porosity (Frature & fissure) in these rocks, topographical set up coupled with precipitation in the form of rain and snow, mainly govern occurrence and movement of ground water. The district is underline most by hard rocks, which form aquifer of low yield prospect. In the terrace deposits along the major rivers pore spaces between sand, gravel and tallus material also form the avenue for ground water movement.

Major parts of the district are hilly & mountainous with highly dissected and undulating terrain. These areas are underlain by consolidated hard rocks of Proterozoic period. Ground water potential in such areas is very low due to its hydro-geomorphic set up. Springs are the main ground water structures that provide water for domestic and irrigation in major rural and urban centers.

Springs in the district are mainly gravity, contact or fracture type and springs located along major thrust/faults or structurally weak planes are high yielding. The springs, locally called C*hasma*, discharges varies from seepages to as high as ten litres per second. *Bowries*, a type of dug well, are another structure constructed in the hill slopes to tap the seepages. Such *Bowries* are very common and observed all over the district.

Besides this two dug wells were also found in the area at village Sandhu and Chambi. These wells were constructed by the local folk to explore the availability of ground water during summer season. The dug wells were reported to yield very low and dry out in summers. The wells are now have been abandoned. Central Ground Water Board, NHR, Dharamshala, under exploration to know the aquifer system of the hard rock one deep tube well of 302 m bgl depth has been constructed at Ashwani Khad. The well has a discharge of about 1173 lpm with drawdown of 24.62 lpm/m and transmissivity of 70.39 m^2/day.

Recently, state department have drilled shallow bore wells fitted with hand-pumps to provide domestic water. The hand pumps have depth up to average 50-60m depth have low discharges up to 1 lps.


Himachal Pradesh
DISTRICT SHIMLA
Hydrogeology
N
W
E
S
0 15 30
kilometres
KULU DISTRICT
KINNAUR DISTRICT
RAMPUR
KUMARSAIN
NANKHARI
MANDI DISTRICT
SAINJ RIVER
SEONI
CHIRGAON
DODRA KWAR
ROHRU
PABBAR RIVER
TIKA
KOTKHAI
JUBBAL
THEOG
SHIMLA
SOLAN DISTRICT
JUNGA
GIRI RIVER
CHAUPAL
NERUA
SIRMAUR DISTRICT
UTTARANCHAL STATE
CHETA
TONS RIVER
Wells feasible
Rigs suitable
Depth of Well (m)
Discharge (lpm)
Suitable artificial Recharge structures
Soft rock aquifers
Tube well
DTH with Odex
100-150
1200-2500
Dug well
Manual
10-20
300-500
Check dam, Check cum ground water dam, Recharge shaft
Hard rock aquifers
Dug well
Manual
10-20
300-500
Spring development
30-2000
Thrust
Fault/Lineament
Tehsil boundary
Major drainage
District boundary
State boundary
Hot water spring (50 °C)
Spring

4.2 Ground Water Quality

Chemical quality data of ground water sample from Springs , Handpumps and tubewells, collected and analysised during earlier studies carried out in the district indicates that ground water is generally alkaline in nature and suitable for both domestic and irrigation use. All the parameters analyzed are well within the permissible limit of safe drinking water as per Bureau of Indian Standard (BIS).

Though contamination of ground water have not been reported in the district so far, however, the fast increase in population/tourist population in the major towns, mainly Simla the state capital is highly vulnerable to pollution from Municipal effluent and small industries. There is thus need to have proper ETPs and waste disposal system with all the industries and major towns. Proper monitoring is very much required.

4.3 Status of Ground Water Development

In most of the district area due to poor potentialities in hilly hard rock areas and hilly sloppy terrain, groundwater development is low. However, in these areas, major water supply and sources of water are ground water based viz., perennial springs, *bowries* and hand pumps. Springs are tapped at the source so that the water can be supplied under gravity. All major towns and villages are supplied water from ground water sources.

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 Ground Water Development

In hilly and mountainous area of the district ground water development through the traditional ground water sources viz. Springs *(chasmas*), *Bowries* and perennial streams are the only possible apart from the shallow bores or hand pumps in favorable locations. Proper development of springs is essential as it is observed that most of the spring does not have collection chamber or tanks from where water can be distributed under gravity. The objective of spring development should be to collect the flowing water underground, to protect it from surface contamination and

store it in sanitary spring box for supply. Similarly, *seepage springs* along hill sides also need to develop for harnessing ground water in such areas.

In the last decade number of shallow bore wells fitted with hand pumps have been constructed in these areas serving as the source of water supply for domestic uses in the district. In the hilly areas and shallow bore wells in favorable location are feasible. However, looking to the fragile eco-system drilling activity should be minimum.

5.2 Water Conservation & Artificial Recharge

Ground water is the major source for irrigation & domestic water supply in both rural and urban areas. In most parts the availability of water during summer is limited particularly in hilly areas in drought/ low rain fall years. There is thus immediate need to conserve and augment water resource. Based upon the climatic conditions, topography, hydro-geology of the area, suitable structure for rain water harvesting and artificial recharge to ground water body need to be planned and implemented. Roof top rainwater harvesting in urban/rural areas and water harvesting in rural area need to be adopted and proper scientific intervention for spring development and revival of traditional water storage is required in water scarce hilly upland areas.

The hilly areas receive fair amount of rainfall & ample scope exist for implementing roof top rain water harvesting by constructing appropriate harvesting structures. Such structures should be replicated to conserve and augment water resources. There should be mandatory provision under law to construct roof top rainwater harvesting structures in all schools, colleges, offices and *pucca* buildings. In similar way, the defence establishments can also have such water harvesting provisions.

6.0 GROUND WATER RELATED ISSUES & PROBLEMS

Most of the ground water issues and problems in the district are localized and need to be treated independently by taking the micro level studies in a particular area. In hilly and mountainous parts, the most common issues relate to scarcity of water particularly in low precipitation year during non-monsoon period when dwindling levels and spring discharges are seen. Rainwater harvesting and awareness for water conservation, protection and water harvesting are measures that need to be taken.

7.0 AWARENESS & TRAINING ACTIVITY

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

So far no Mass awareness Programme (MAP) & Water Management Training Programme (WMTP) had conducted in the district.

8.0 AREAS NOTIFIED BY CGWA / SGWA

No area or block has been notified for groundwater development point of view.

9.0 RECOMMENDATIONS

- In hilly and mountainous terrain, traditional ground water sources viz., springs, *bowries* etc needs to be developed and protected for better health and hygiene with proper scientific intervention.
- Springs needs to be inventoried & studied for optimum utilisation of their discharge either by fracturing, horizontal drilling or by constructing galleries etc.
- Urban areas are highly prone and vulnerable to surface & ground water pollution thus water quality monitoring at close network is essential.
- Proper waste/effluent disposal measures are required to be adopted by state authorities needs to check this.
- Roof top rainwater harvesting practices can be adopted in hilly areas and urban areas, since the district receives fair amount of rainfall. Construction of roof top rain water harvesting structures should be made mandatory in all new construction and rain water harvesting in rural areas should be promoted. Traditional water storage systems need to be revived.
- People's participation is a must for any type of developmental activities. So proper awareness for utilization and conservation of water resources is required.

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

Contact:

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