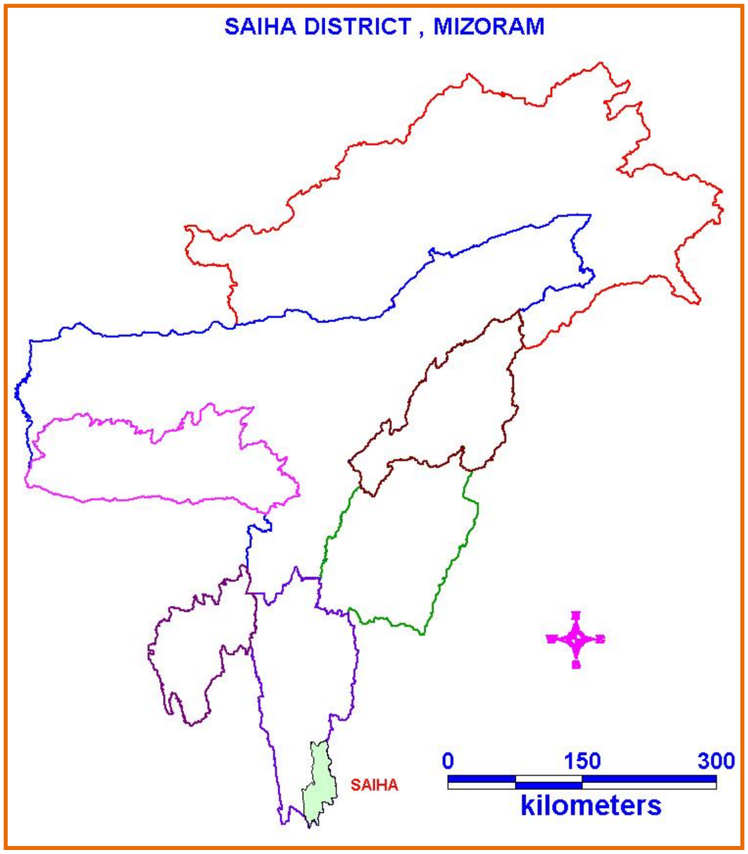
Technical Report Series: D

Ground Water Information Booklet
Saiha District, Mizoram



Central Ground Water Board
North Eastern Region
Ministry of Water Resources
Guwahati

GROUND WATER INFORMATION BOOKLET
SAIHA DISTRICT, MIZORAM

DISTRICT AT A GLANCE

Sl. No.	ITEMS	STATISTICS
1	GENERAL INFORMATION	
	i) Geographical Area (sq.km.)	1,399.9
	ii) Administrative Division (as on 2013) Number of Tehsil /CD Block Number of Panchayat/Village	 2 Blocks -
	iii) Population (as on 2011 Census)	Total 61056
	iv) Average Annual Rainfall (mm)as on 2009	3244.9mm
2	GEOMORPHOLOGY i) Major Physiographic Units ii) Major Drainages	Denudo Structural Hills with moderate ridges and limited valley fills. Kaladan or Tuipui River & Boinu or Tuipui River with its tributaries.
3	LAND USE (sq.km.) i) Forest Area ii) Net Area Sown iii) Cultivable Area	Mostly Jhum / Shifting cultivation. NA NA NA
4	MAJOR SOIL TYPES	Colluvial soil forms along the steep side slopes.
5	AREA UNDER PRINCIPAL CROPS	Mainly practised Shifting or Jhum cultivation
6	PREDOMINANT GEOLOGICAL FORMATIONS	Tertiary Formations of Miocene age.
7	HYDROGEOLOGY i) Major Groundwater Bearing Formations	 Semi-consolidated formations of Tertiary rocks. Ground water occurs in the form of spring which emanates through cracks/fissures/joints etc. available in the country rock.
8	GROUND WATER QUALITY i)Presence of Chemical Constituents more than Permissible Limit (e.g. EC, F, Fe, As) ii) Type of Water	Chemical constituents are within the permissible limit. Ground water is fresh and potable and is suitable for domestic and industrial purposes. Good and potable

9	DYANMIC GROUND WATER RESOURCES (2009) in mcm i) Net annual ground water availability ii) Net Annual Ground Water Draft iii) Projected Demand for Domestic and Industrial Use up to 2025 iv) Stage of Ground Water Development	 2.91 0.03 0.05 1.03%
10	EFFORTS OF ARTIFICIAL RECHARGE AND RAINWATER HARVESTING i) Projects Completed by CGWB (No & amount spent) ii) Projects Under technical Guidance of CGWB (Numbers)	 1 Project comprising Rain Water Harvesting Structure has been completed under Central Sector Scheme. Nil
11	GROUND WATER CONTROL AND REGULATION i) Number of OE Blocks ii) Number of Critical Blocks iii) Number of Blocks Notified	 Nil
12	MAJOR GROUND WATER PROBLEMS AND ISSUES	In spite of good rainfall, there is an acute shortage of water especially during the summer.

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SAIHA DISTRICT, MIZORAM

1.0 Introduction

Saiha district of Mizoram is located in the southeastern part of the state. It is bounded by Lawngtlai and Lunglei districts in the west and north respectively. The southeastern part is occupied by Myanmar. It lies in between North Latitude 21^0 $57^/$ $00^{//}$ to 22^0 $45^/$ $00^{//}$ and East Longitude $92^0 13^/ 00^{//}$ to 93^0 $29^/$ $00^{//}$ covering an area of 1,399.9 sq. km. The district has been sub-divided into two blocks.

As per 2011 census, the density of population is 43 persons per sq. km. Slope cultivation locally called shifting or jhum is the main agricultural system in the district. The district receives heavy rainfall during May to late September with an average annual rainfall of 3244.9(as on 2009 census)mm under the influence of southwest monsoon.

Physiographically, the district is represented by North-South trending hill ranges with serrated top and hogback pattern. The hills are highly dissected and separated by intervening 'V' shaped narrow valleys. Numbers of perennial streams flow through the district from North to South and join the Kaladan Tuipui River.

Geologically, the district is occupied by shale, siltstone and sandstone of Surma formation of Miocene age.

Ground water stored in the hill slopes emanates in the form of springs, which are being used as a source of water supply. From quality point of view, most of the chemical constituents in ground water are within the permissible limit.

The estimated net annual ground water availability is 2.46mcm while net ground water availability for future irrigation development is 2.40 mcm. The stage of ground water development is1.06%. Future provision for domestic and industrial use is 0.05 mcm.

The present ground water utilization is for domestic and to some extent for agriculture purposes as there is no major industry in the district.

2.0 Rainfall and Climate

The district experiences tropical humid climate with cool summer and cold winter. The rainfall is mainly due to the monsoon in early May to late September. The average annual rainfall is 3244.9 mm(as on 2009 census) Winter temperature varies between 11^0 and 13^0 C in general. The winter season is however, without snow fall. Climatic disturbances in the Bay of Bengal have marked influence in the intensity of rainfall.

3.0 Geomorphology and Soil Types

A. Geomorphology:

Physiographically, the district is characterized by north-south trending parallel to sub-parallel hill ranges with synclinal narrow valleys. The hills are steep and separated by rivers, which flow either to North or to the South, creating deep gorges. Basically, these are structural hills. The denudation and weathering is still under going in response to various processes. One of the dominant processes of the formation of such landform is running water. Based upon relief, drainage, lithology and structural pattern; the district has been divided in to two major units **a**. denudostructural hills and **b**. valley fills.

a. Denudostructural Hills:

The district is mostly occupied by denudostructural hills, i.e. the processes of denudation have not yet obliterated the structural features such as dip facet and strike trend, anticline and syncline. This major form has been further classified as follows:

I. Moderate linear ridges:

The entire district is mostly occupied by these hill ranges except very limited areas of valley fill areas. The hills are highly dissected and separated by 'v' shaped narrow valleys. The rocks are of hard and compact nature with soft rock alternations. The main constituents are hard and compact sandstone, shale and siltstone, alternations of Bhuban formations. The major drainage shows parallel and trellis pattern forming deep gorges and water gaps.

b. Valley fills:

The valley fills are unconsolidated alluvial and colluvial patches of limited areal extent deposited by rivers/ streams and occur in the southern part of the district.

B. Soil Types:

The soils of the district, in general, have been derived from parent rock such as ferruginous sandstone, shale, alluvial and colluvial materials. In general, the soil formations have been categorized in to following groups:

a) Hills: It includes colluvial soil, formed along the steep side slopes because of accumulation of material on slope surface.

b) Valleys: Occur as a mixture of colluvial and alluvial materials. It is restricted to the valley fill areas along the river/ stream courses.

c) Terraces: These are the remnants of deposits of cobbles and pebbles, which make it excessively drained.

4.0 Ground Water Scenario

4.1 Hydrogeology

Hydrogeologically, the entire area of Saiha district is occupied by semi-consolidated formations of Denudostructural hills belonging to Surma formations of Tertiary age with limited areal extent of valley fill areas in the southern part of the district. The moderate linear ridges comprise mainly mixture of arenoargillaceous assemblages such as shale, siltstone. mudstone and hard compact sandstone of Bhuban group of rocks. The unit is characterized by very low permeability and infiltration. It acts as run off zone. Ground water potential is low, localized potential in limited way can be attributed through development of secondary porosity through cracks. The valley fill areas with limited areal extent located around Phura village are underlain by shale, sandstone and siltstone alternations. The valley is about 25 km long and 0.5 km wide, covering a total area of about 12.5 sq. km. No ground water abstraction structures have been noticed in the valley. The ground water structures may be constructed tapping shallow aquifer in the suitable locations of the valley. The aquifer formed in the valley shows low permeability. Ground water potential is low.

The occurrence of ground water in such a terrain is mainly restricted to weak zones such as fractures, lineaments and weathered residuum. These tectonic elements create seepage conduits, which are sources of springs. These springs are utilized as the main sources of water supply to the population. The existing water supply for drinking purposes is mainly from those springs tapped through gravity drainage. A good number of springs were inventoried during earlier field investigation. All the springs are fractures and joints oriented. A large number of springs are perennial. In general, the discharge of the springs are very meager in high altitudes and it progressively increase towards lower altitudes. The discharge of the spring is varying between 3000 and 20,000 liters per day during the period of January to March, which is generally dry period.

4.2 Ground Water Resources

The ground water resources of the district have been calcuted based on rainfall infiltration factor method. The method is considered because of lack of data especially on population, number of ground water structures, draft and other important parameters in watershed. Water level trend is also not available due to lack of ground water abstraction structures, hence the annual ground water recharges of all the assessment unit have been computed by the Rainfall Infiltration Factor method.

The smallest administrative unit, i.e. the R.D.Block has been taken as the unit of computation. The area is mostly occupied by hills with very steep slopes these are more than 20%. As per GEC-97 these hilly areas are not taken into account for resource computation.

The estimated net annual groundwater availability is 2.91mcm while net annual ground water draft is 0.03 mcm. The stage of ground water development is 1.03%. Future provision for domestic and industrial use is 0.05 mcm and for irrigation use, it is 2.860 mcm.
Saiha district is under the 'SAFE' category.

4.3 Ground Water Quality

As per earlier field investigation reports, it is found that water sample collected from springs indicates pH values range between 6.9 and 8.3. Electrical conductivity of the water is found to vary from 31- 249 micromhos/cm at 25^{O}C except few places. The concentration of bicarbonate ranges from 12 to 158 ppm. The range of concentration of Calcium and Magnesium is in between 4-22 and 1-10 ppm respectively. Concentration of Iron ranges from 0.02 to 0.3 ppm and is within the permissible limit of 0.3 ppm.

In general, the chemical quality of ground water in the district is fresh and potable and is suitable for domestic and industrial purposes.

4.4 Status of Ground Water Development

The entire district is covered by hills of semi-consolidated rocks of Tertiary age. The main constitutes are mostly siltstone, claystone and compact sandstone. Because of steep slope of the hill (more than 20%), rainwater flows out as surface run-off. Hence, there is an acute shortage of water during summer. In this type of hilly terrain, the scope for ground water storage is limited. In general, secondary porosity and structural control play an important role in formation of ground water repository in the higher elevation. These aquifers are the main source of springs.

Ground water is used for drinking purpose only in the district. As there is no industry in this district, ground water utilization for the same may be considered as negligible. Due to hilly terrain, spatial variation of rainfall, nature of soil, non-availability of irrigation (e.g. from ground water and surface water), the people practice 'jhum' cultivation.

5.0 Ground Water Management Strategy

Hydrogeological investigation carried out by Central ground Water Board revealed the occurrence of perennial springs in the different altitudes. A good number of perennial springs also exist in the district. The discharge of the springs progressively increases in the lower altitudes. These springs can be developed scientifically for providing safe drinking water to the rural people. Shallow ground water structures may also be attempted in the limited valley-fill areas in the district. Rainwater harvesting technique, which is well known to the people of the district in remote areas, can also be used for solving the scarcity of potable water.

5.1 Rainwater Harvesting Structures Constructed Under Centrally Sponsored Scheme

Village wise volume of water used and number of persons benefitted are detailed below.

Sl No.	Name of district/ block	Name of village	Volume of water used (litres)	No. of persons benefitted
1	Saiha/Sangau R.D. Block	Fungkah	15,800	296

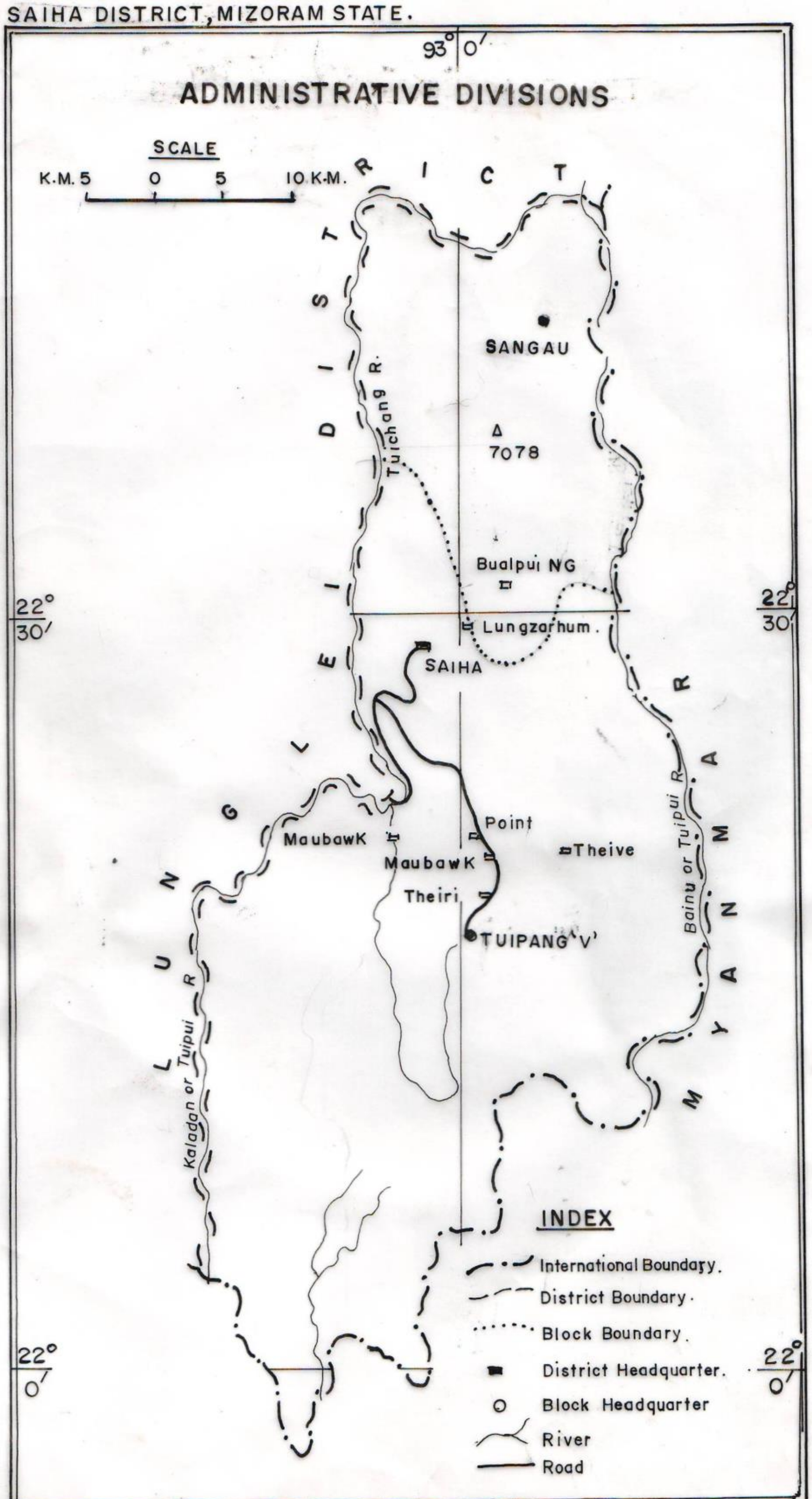
6.0 Recommendations

Limited ground water development prospects in small areas of valley-fills occur in the southern part of the district. In the valley-fill areas of Phura and other small valleys, the thickness of alluvium is very limited (within 10-15 m). Though, the valleys are underlain by shale, siltstone and sandstone, part of which may be saturated and it can support dug wells as abstraction structures. Ground water structures do not exist at present. Thus, ring well with 2-3 m diameter and 10-15 m depth below ground level may be constructed in the suitable locations. These wells may be constructed with half baked bricks keeping weep holes.

Ground water is flowing out through numbers of springs widespread in the district. These springs can be developed scientifically for providing safe drinking water to the rural people. It is observed that people are to walk long distance in rugged terrain to fetch drinking water. Rural folk will be benefitted by tapping perennial springs in such areas.

Rainwater harvesting is another suitable age old and time tested technology for augmenting water for the drinking water supply and it can be one of the appropriate and economical measures for solving the scarcity of potable water in such areas. It involves relatively low cost, less time for implementation and provides almost safe water at doorsteps.

SAIHA DISTRICT, MIZORAM STATE.



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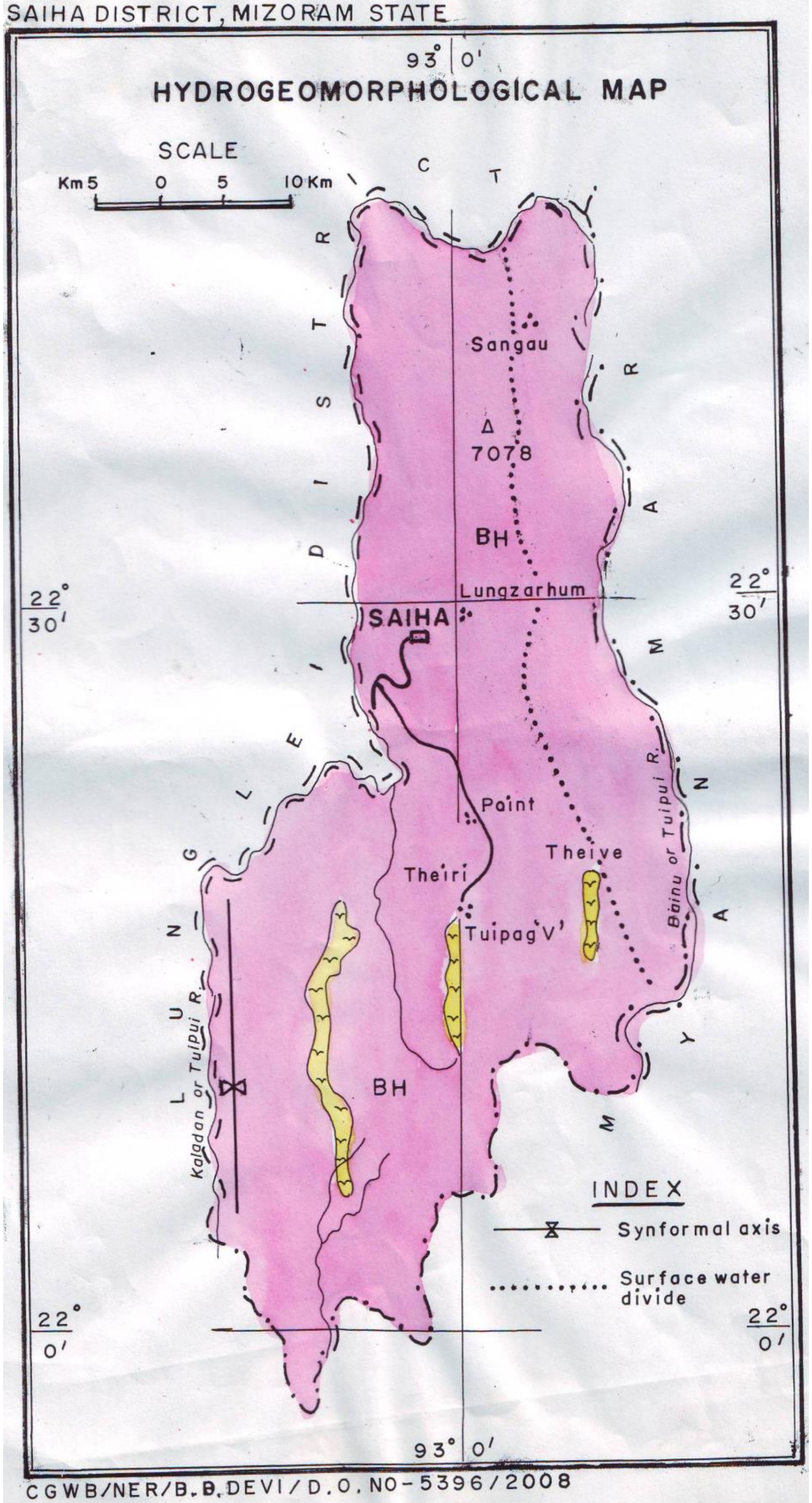
SAIHA DISTRICT, MIZORAM STATE



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SAIHA DISTRICT, MIZORAM STATE

LEGEND

AGE	FORMATION		GEOMORPHIC		HYDROGEOLOGICAL CHARACTERS
	SERIES	GROUP	UNIT	FORMS	
			(A) DENUDO STRUCTURAL HILLS		
MIOCENE	SURMA	BHUBAN	BH Moderate linear ridges	Hogs back Cuesta	Consists of hard and compact sandstone, shale, siltstone alternation. Permeability is very low and infiltration is negligible, (Act as run-off zone. Gound water potential low, localised potential in limited way can be attributed through development of secondary porosity through cracks)
			(B) VALLEY		
OLIGOCENE			Valley fills		Undelain by clay, silt and sandstone moderate gound water potential zone can be expected through shallow aquifers.

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