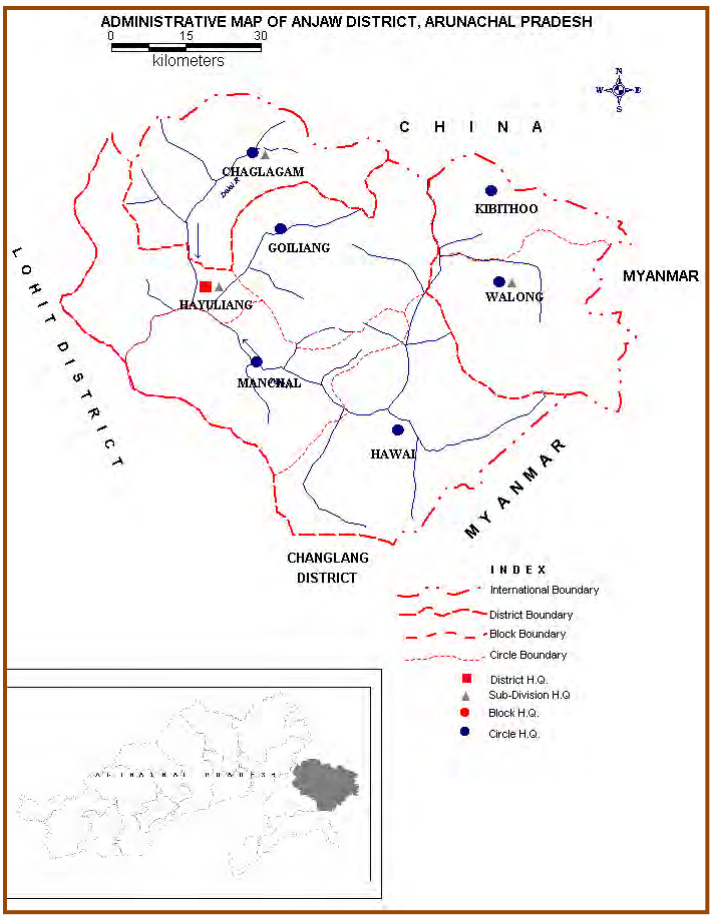
Technical Report Series: D **No: 25/2009-10**

Ground Water Information Booklet

Anjaw District, Arunachal Pradesh



Central Ground Water Board

North Eastern Region

Ministry of Water Resources

Guwahati

August 2009

GROUND WATER INFORMATION BOOKLET
ANJAW DISTRICT, ARUNACHAL PRADESH

AT A GLANCE

Sl No.	ITEMS	Statistics
1.	GENERAL INFORMATION	
	i) Geographical area (sq.km)	6190 sq.km
	ii) Administrative Sub-division (As on 2006)	1
	Number of blocks	3
	Number of circles	7
	iii) Population (As on 2001 Census)	18441
	iv) Average annual rainfall (mm)	5179 mm
2.	GEOMORPHOLOGY	
	Major physiographic units	Rugged mountainous and forested terrain with intermontane valleys
	Major drainages	Lohit, Delei & Tellu Rivers
3.	LAND USE (sq.km)	
	a) Forest area :	More than 80% is covered by dense forest and the rest by open forest. Shifting (jhum) cultivation in the hills and permanent cultivation in the foot hills and plains are practised.
4.	MAJOR SOIL TYPES	Red sandy soil and skeletal soil
5.	AREA UNDER PRINCIPAL CROPS (As on 2005-06)	7072 ha
6.	IRRIGATION BY DIFFERENT SOURCES (Areas and Numbers of Structures)	
	Dugwells	
	Tubewells/Borewells	NIL
	Tanks/Ponds	NIL
	Canals	Minor irrigation projects are being implemented through channel irrigation.
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31-03-2009) No. of Dug Wells No. of Piezometers	 Nil Nil
8.	PREDOMINANT GEOLOGICAL FORMATIONS	Granodiorite and diorite Complex (Mishmi Massif) and chlorite schist with serpentinite and crystalline limestone
9.	HYDROGEOLOGY	
	➢ Major water bearing formation	Semi-consolidated formations of Tertiary rocks. Ground water occurs in the form of spring emanating through cracks/ fissures/ joints etc. available in

		the country rock.
10.	GROUND WATER EXPLORATION BY CGWB (As on 31-03-2009)	Nil
11.	Presence of chemical constituents in more than permissible limit	Nil
	Type of water	Soft and potable
12.	DYNAMIC GROUND WATER RESOURCES (2004) IN MCM	
	Annual Replenishable Ground Water Resources	909.21 mcm
	Net Annual Ground Water Draft	0.15 mcm
	Net Annual Ground Water Availability	907.96 mcm
	Projected Demand for Domestic and industrial uses upto 2025	1.10 mcm
	Stage of Ground Water Development	0.02
13.	AWARENESS AND TRAINING ACTIVITY	Nil
14.	EFFORTS OF ARTIFICIAL RECHARGE AND RAIN WATER HARVESTING	
	Projects completed by CGWB	Nil
	Projects under technical guidance of CGWB	Nil
15.	GROUND WATER CONTROL AND REGULATION	
	No. of OE blocks	Nil
	No. of critical blocks	Nil
	No. of Blocks notified	Nil
16.	MAJOR GROUND WATER PROBLEMS AND ISSUES	Nil

GROUND WATER INFORMATION BOOKLET
ANJAW DISTRICT, ARUNACHAL PRADESH

1.0 INTRODUCTION

The Anjaw district of Arunachal Pradesh is strategically situated in the northeastern corner of the country. It is bounded by Tibet (China) on the north, by Myanmar in the east, on the south by Changlang district and on the west by Lohit district. The district covers an area of 8600 sq. km and has a population of 18,441(2001 census).

The Anjaw district was created in December, 2003 by upgrading the earlier Hayuliang sub-division of Lohit district. The district with its headquarters at Hayuliang has three blocks and seven circles.

The district falls in the heavy rainfall belt and it has plenty of surface water resources. Major part of the district is occupied by hills and forests. Alluvial area is negligible. Agriculture is the mainstay of the inhabitants. The river system of the district is a part of the Brahmaputra River basin. Lohit is the principal river. Other prominent rivers are Delei and Tellu Rivers which are tributaries of Lohit River. Lohit and its major tributaries are perennial. Even the streams of the district are mostly perennial and maintain varying amount of base flow. The rivers flow in the south-westerly direction. The drainage pattern is generally dendritic to sub-parallel in nature and follows the geomorphological trends of the hills and mountains. In the hilly terrain, the rivers have deep narrow gorges along their courses.

Agriculture is the mainstay of the people of Anjaw district. By and large, the traditional shifting cultivation is practised by most of the people in the hills. Permanent wet-rice cultivation is also practised, but limited to the plain belt along the foothills. Cultivable waste lands usually situated in the low lying areas along the intermontane valleys which have been developed for permanent cultivation. The agriculture of the district mainly depends on monsoon rainfall. However, irrigation potential has been

created for changing ‘shifting’ cultivation into permanent cultivation in the available land of foothills and valleys. A few minor irrigation projects have been implemented in the district

2.0 RAINFALL AND CLIMATE

The district falls under heavy rainfall belt and is characterized with a rainy summer and dry winter. Heavy rainfall is received during summer and occasional rainfall during winter. January and February are the driest months. The rainfall received during summer is under the spell of South-West monsoon. The onset of South-West monsoon occurs by the end of May or the first week of June and it withdraws by late September or early October. But, very often pre-monsoon showers are experienced during March to April/May; the region comes under the influence of equatorial westerly wind and receives precipitation with occasional thunder showers. Annual rainfall in the district varies from 3500 to 5500 mm.

The climate of the district is largely influenced by the nature of its terrain. The climate is sub-tropical, wet and highly humid in the lower elevations and the valleys; and intensely cold in the higher elevations. The summer is moderate and extreme cold in winter. However, the mountain peaks are covered with perpetual snow. In winter, temperature falls below freezing point in higher altitudes.

3.0 GEOMORPHOLOGY AND SOIL TYPE

Two third of the district constitutes the part of the Lesser Himalayan Range. This zone rises abruptly from the plains and comprises a rugged mountainous and forested terrain with conspicuous NW-SE trending ridges having altitudes above 3000 m in its middle reaches. The valley area is found along the River Lohit and its tributaries.

The nature and properties of soil vary with the area. Soil in greater part of the district is red sandy soils and skeletal soils. In the hilly regions, the soil generally contains high humus and nitrogen due to extensive cover of forests. The soil along the foothill areas is alluvial, loamy or sandy loam mixed with gravel and pebble brought down by rain waters from high altitudes. The soil in the valley is clayey alluvium and rich in organic content. The main characteristic of the soil is acidity which increases with the amount of rainfall received and heaviness of the soil in most parts; it is sandy and progressively clayey in nature. The mountain soils are red to brown in colour and are good for cultivation of dry paddy, maize etc.

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

The occurrence and behaviour of ground water is controlled by climate, topography, geology, structure etc. The major part of the district is occupied by consolidated formations of Mishmi massif and Tidding formation. The ground water conditions in the district can best be described under two distinct hydrogeological units, i.e. i) conditions prevailing in the consolidated formations and ii) conditions prevailing in the unconsolidated formations.

i)Consolidated formations

The consolidated formations include the high and moderate hill ranges of the district. These formations are mostly comprised of gneissic, granodioric and schistose rocks and fissured formations (phyllite, schist, quartzite etc.) belonging to Archaean and Paleozoic age. The area acts basically as run-off zone and has little importance from ground water point of view. However, secondary porosity like cracks, joints, fissures etc. at places, aided with thickness of weathered zone and slope factor may yield good amount of ground water. The occurrence of ground water in such 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 source of water supply to the populace. The existing water supply for drinking purposes is mainly from those springs tapped through gravity drainage. All the springs are fractures and joints oriented. A large number of springs are perennial. In general, discharges of the springs are meager in high altitudes which progressively increase down slope.

ii)Unconsolidated formations

The unconsolidated Quaternary sediments occupy the small valley areas. They are distributed as thin layers in intermontane valleys. Sedimentation pattern is not uniform all over.

4.2 Ground Water Resources

The entire district is occupied by hill ranges with very steep slopes that are more than 20%. Moreover, no details about the recharge potential in these hills are available. As per GEC, 97 these hilly areas are not taken into account for resource computation. Due to lack of data especially on population, number of ground water structures, draft of ground water and other important parameters on watershed basis, the smallest administrative unit, i.e. the R.D. Block has been taken as the unit of computation. 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 estimated gross annual dynamic groundwater resource (including Lohit district) is 4.02 mcm while net annual ground water draft is 0.02 mcm.

Anjaw 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 that pH values range between 7.0 and 7.85. Electrical conductivity of the water is found to vary from 72 to 331 micromhos/cm at 25^{O}C. The concentration of bicarbonate ranges from 32 to 200 ppm. The range of concentration of calcium and magnesium is in between 8 & 52 and 2.4 & 26 ppm respectively. Concentration of chloride ranges from 7 to 14 ppm. In general, the chemical quality of ground water in the district is fresh and potable and is suitable for domestic, irrigation and industrial purposes.

4.4 Status of Ground Water Development

The entire district is covered by hills of consolidated rocks of Archaean and Palaeozoic age. The rock types are comprised of mostly schist, granodiorite and gneiss. The consolidated formation occupying the hills and forests are not considered for ground water prospects. Though, the district receives heavy rainfall, most of the rain water flows out as surface run-off. The scope for ground water storage is limited mostly to secondary porosities which are controlled structurally. These aquifers are the main source of springs. Ground water emanating in the form of springs are being used as a source for water supply.

Ground water is used mainly for drinking purpose as there is no major industry in the district. Ground water utilization for irrigation is negligible. Due to hilly terrain, spatial variation of rainfall, nature of soil, non-availability of irrigation facilities, people practise shifting and terraced cultivation.

5.0 GROUND WATER MANAGEMENT STRATEGY

5.1 Ground Water Development

Earlier hydrogeological investigations carried out by the Central Ground Water Board in the district revealed the occurrence of a good number of perennial springs in different altitudes. The discharges of the springs progressively increase in the lower altitudes. These springs can be developed scientifically for providing safe drinking water to the rural people. Discharge of springs may be increased by widening of fractures. Rain water harvesting which is well known to the people of the district may also be adopted for solving the scarcity of potable water. Large diameter dug wells in the valley areas may provide sufficient water for domestic purposes.

5.2 Rainwater harvesting structures constructed under centrally sponsored scheme

Nil

6.0 AWARENESS AND TRAINING ACTIVITY

6.1 Mass Awareness & Training Programme

No Mass Awareness and Training Programme were held in the district.

7.0 RECOMMENDATIONS

Existing hydrogeological set up indicates the limited ground water development prospects in the intermontane valleys. The valleys are underlain by sand, silt, gravel with clayey matrix. The intercalated sand layers may be productive for construction of shallow ground water structures. Thus, ring well with 2-3 m diameter with 10-15 m depth may be constructed in the suitable locations.

In the major part of the district, tapping perennial springs would remain the main sources for water supply to the inhabitants. The springs should be properly developed, conserved and protected wherever they are used for domestic purposes. Some of the springs in lower altitudes may be impounded in some structures and pumped again for water supply.

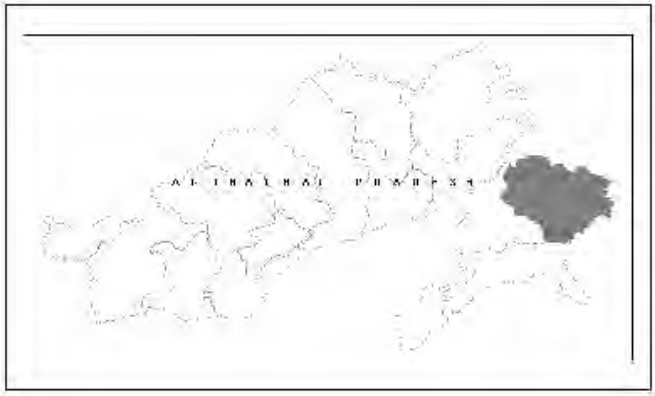
ADMINISTRATIVE MAP OF ANJAW DISTRICT, ARUNACHAL PRADESH

0 15 30

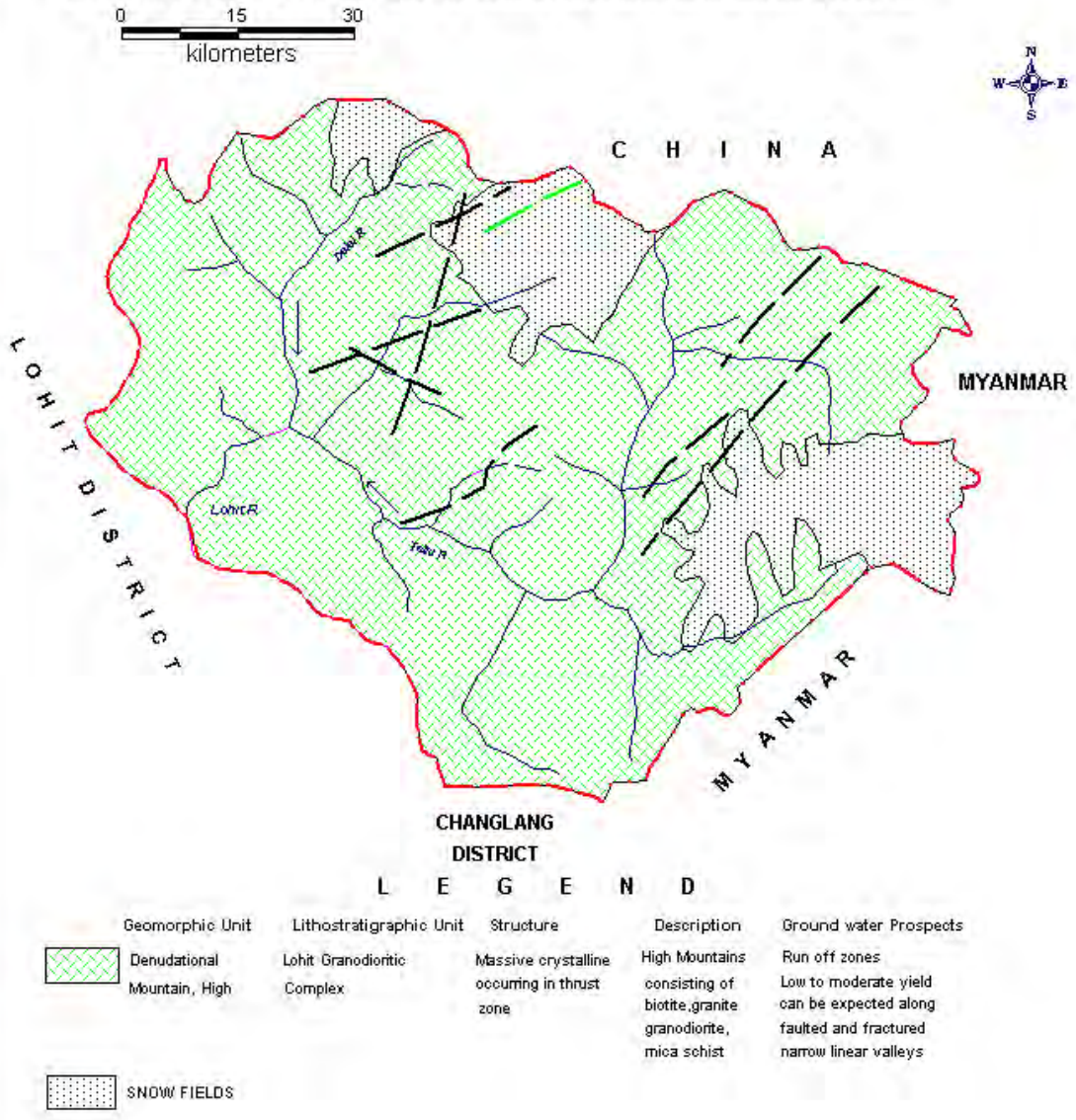
kilometers

INDEX

- International Boundary
- District Boundary
- Block Boundary
- Circle Boundary
- District H.Q.
- Sub-Division H.Q
- Block H.Q.
- Circle H.Q.



HYDROGEOMORPHOLOGICAL MAP OF ANJAW DISTRICT, ARUNACHAL PRADESH



L E G E N D

Geomorphic Unit	Lithostratigraphic Unit	Structure	Description	Ground water Prospects
Denudational Mountain, High	Lohit Granodioritic Complex	Massive crystalline occurring in thrust zone	High Mountains consisting of biotite,granite granodiorite, mica schist	Run off zones Low to moderate yield can be expected along faulted and fractured narrow linear valleys
SNOW FIELDS				