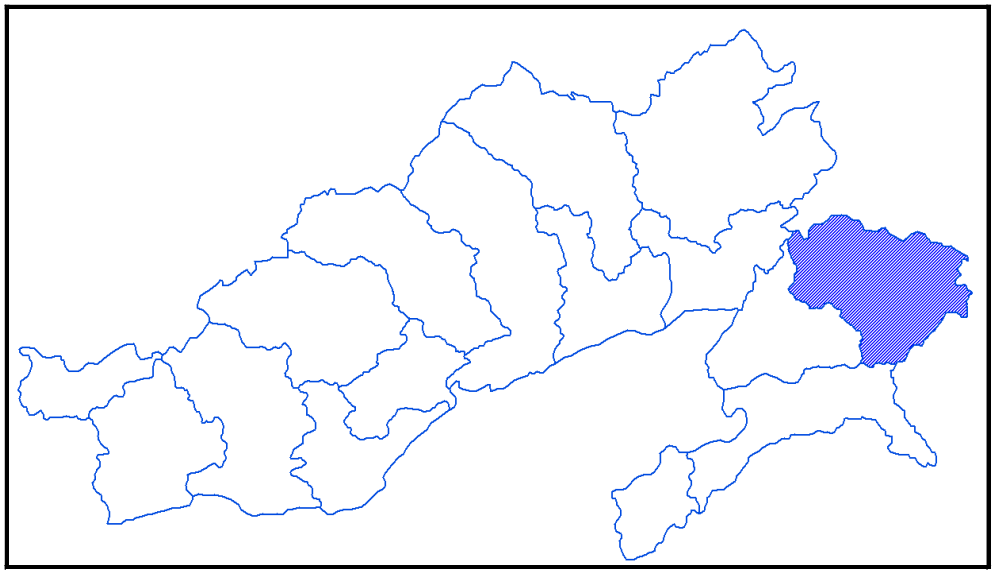
Technical Report Series: D **No:**

Ground Water Information Booklet
Anjaw District, Arunachal Pradesh



Central Ground Water Board
North Eastern Region
Ministry of Water Resources
Guwahati
September 2013

ANJAW DISTRICT OF 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 2011 Census)	21089
	iv) Average annual rainfall (mm)	1917.7mm
2.	**GEOMORPHOLOGY**	
	Major physiographic units	Rugged mountainous and forested terrain with intermontane valleys
	Major drainages	Lohit, Delei & Tellu
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 practiced.
4.	**MAJOR SOIL TYPES**	Red sandy soil and skeletal soil
5.	**AREA UNDER PRINCIPAL CROPS (As on 2011-12)**	34.89 sq.km
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 31-03-2013)** **No. of Dug Wells** **No. of Piezometers**	No NHS as the district have no groundwater abstraction structures Nil Nil
	PREDOMINANT GEOLOGICAL FORMATIONS	Granodiorite and diorite Complex (Mishmi Massif) and chlorite schist with serpentinite and crystalline limestone
	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.

12.	**GROUND WATER EXPLORATION BY CGWB (As on 31-03-2007)**	No exploration activity by CGWB due to inapproachability problem
13.	**Presence of chemical constituents in more than permissible limit**	**Nil**
	Type of water	**Soft and potable**
14.	**DYNAMIC GROUND WATER RESOURCES (2009) IN MCM**	GEC'97 could not be adopted and ground water resources of the district could not be calculated because hill slopes are more than 20% as per GEC'97.
	Annual Replenishable Ground Water Resources	
	Net Annual Ground Water Draft	
	Net Annual Ground Water Availability	
	Projected Demand for Domestic and industrial uses upto 2025	
	Stage of Ground Water Development	
15.	**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**
17	**GROUND WATER CONTROL AND REGULATION**	
	No. of OE blocks	**Nil**
	No. of critical blocks	**Nil**
	No. of Blocks notified	**Nil**
18.	**MAJOR GROUND WATER PROBLEMS AND ISSUES**	**Nil**

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 6190 sq.lm and has a population of 21,089(2011 census).

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

The district falls in the heavy rainfall belt and it abound in surface water resources. Major part of the ditrict 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 which are tributaries of Lohit. Lohit and its major tributaries are perennial. Even the strams of the district are mostly perennial and maintain varying amount of baseflow. 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 peopleof Anjaw district . By and large, the traditional shifting cultivation is practiced by most of the people in the hills. Permanent wet-rice cultivationis also practiced, but limited to the plain belt along the foothills. Cultivable waste land usually situated in the low lying areas along the intermontane valleys 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. Nos. of 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 withdraws by late September or early October. But, very often pre-monsoon showers are experienced during March and April From March to May, the region comes under the influence of equatorial Westerlies and receives precipitation with occasional thundershowers. Annual rainfall in the district varies from 3500 mm to 5500mm.

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 Lesser Himalayan zone of the Himalayan Range. This zone rises abruptly from the plains and comprises a rugged mountainous and forested terrain with conspicuous NW-SE ridges having altitudes above 3000m 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 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 clay alluvium and rich in organic content. The main characteristic of the soil is acidity which increases with rainfall 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. conditions prevailing in the consolidated formations and 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 (phyllites, schist, quartzites etc.) belonging to Archaean and Paleozoic age. They act basically as run-off zone and has little important 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.

i)Unconsolidated formations:

The unconsolidated Quarternary 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 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.

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 P^H values range between 7.0 and 7.85. Electrical conductivity of the water is found to vary from 72-331 micromhos/cm at 25^OC. The concentration of bicarbonate ranges from 32 to 200ppm. The range of concentration of calcium and magnesium is in between 8-52 and 2.4-26ppm 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 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 controlled structurally. These aquifers are the main source of springs. Ground water emanating in the form of springs are being developed for use 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 may be considered as negligible. Due to hilly terrain, spatial variation of rainfall, nature of soil, non-availability of irrigation facilities, people practice shifting and terraced cultivation.

5.0Ground 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 technique which is

well known to the people of the district can also be developed 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

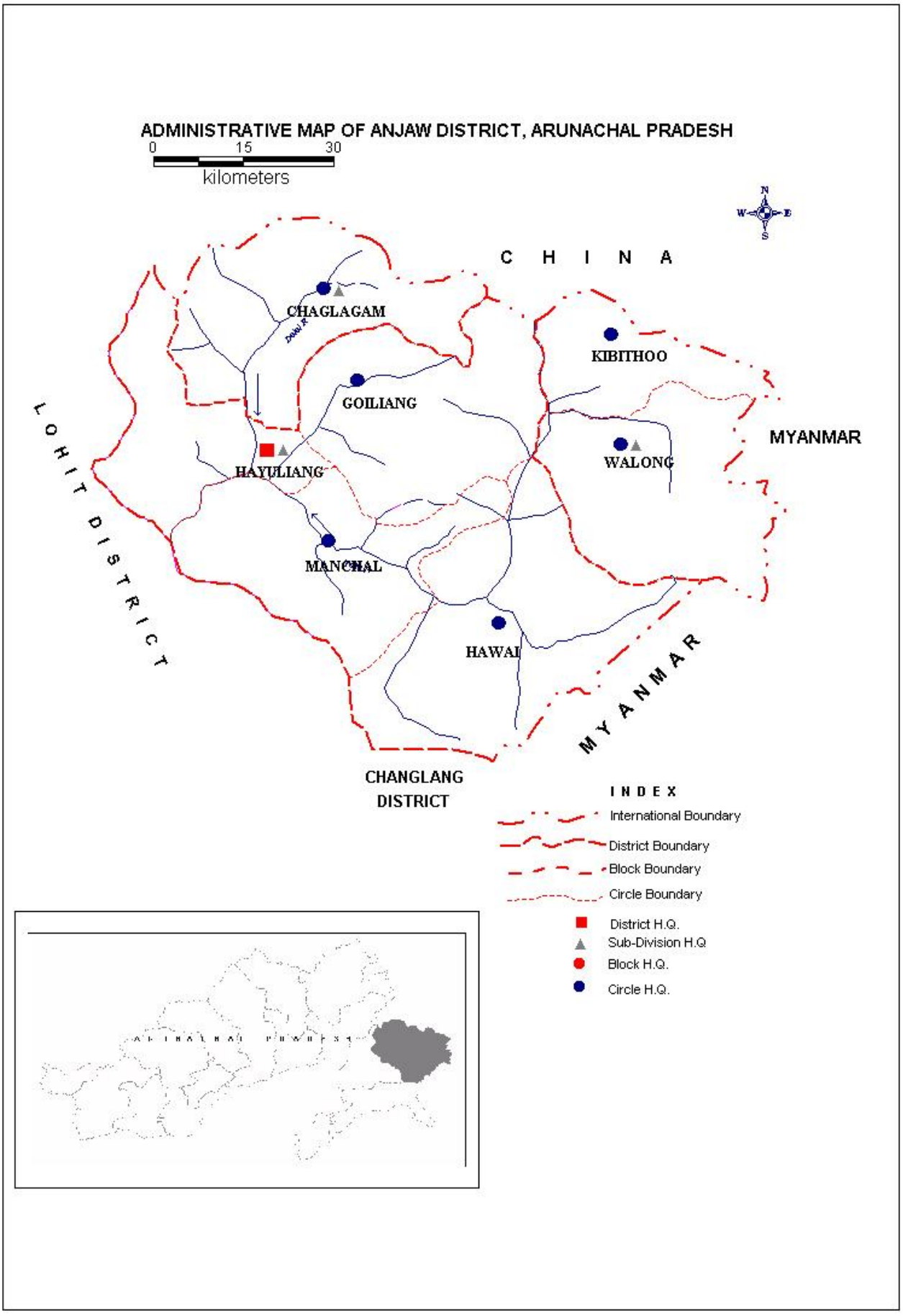
6.1Mass Awareness & Training Programme :

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

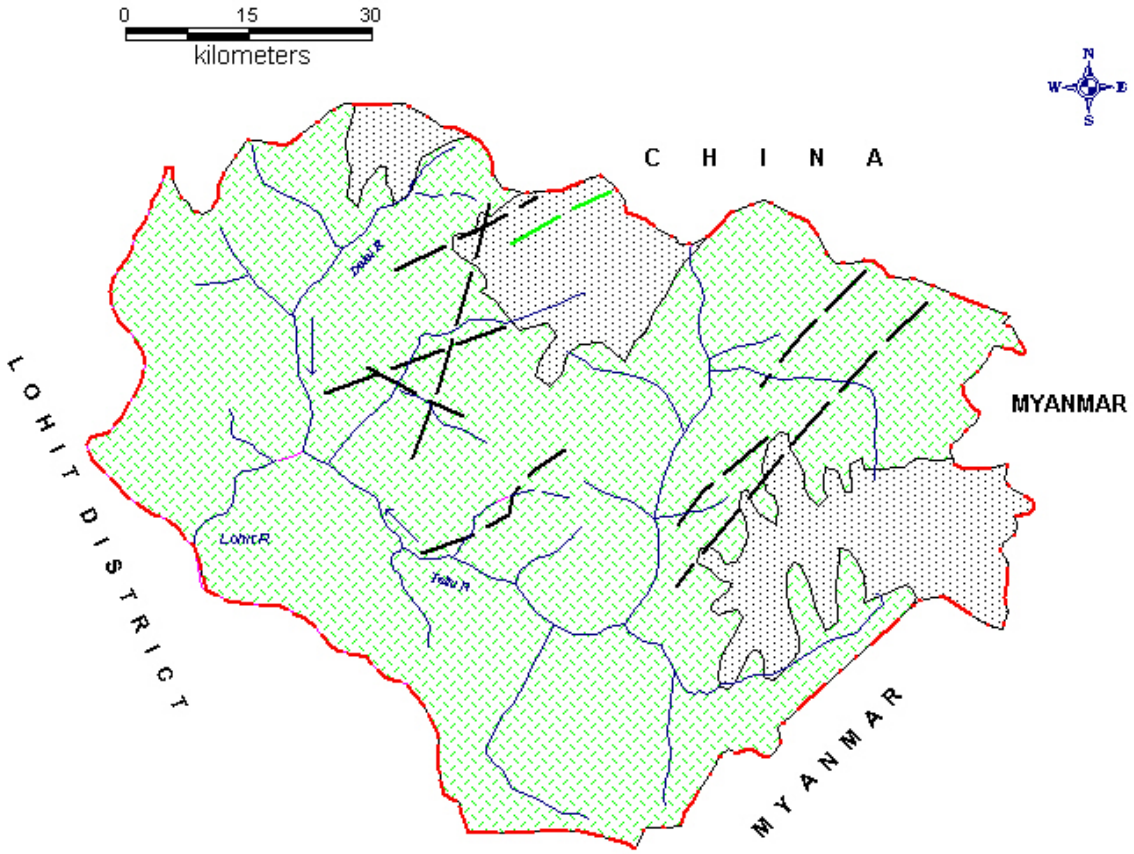
7.0 Recommendations

Existing hydrogeological set up indicates the limited ground water development prospects in the intermontane valleys. The valleys are underlained 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 mm diameter and 10-15 m depth below ground level may be constructed in the suitable locations.

In the major part of the district, tapping perennial springs and rainwater harvesting 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 spring waters in lower altitudes can be impounded in some structures and pumped again for water supply.


ADMINISTRATIVE MAP OF ANJAW DISTRICT, ARUNACHAL PRADESH
0 15 30
kilometers
N
W
E
S
C H I N A
CHAGLAGAM
KIBITHOO
GOILIANG
MYANMAR
WALONG
HAYULIANG
LOHIT DISTRICT
MANCHAL
HAWAI
M Y A N M A R
CHANGLANG
DISTRICT
INDEX
International Boundary
District Boundary
Block Boundary
Circle Boundary
District H.Q.
Sub-Division H.Q
Block H.Q.
Circle H.Q.

HYDROGEOLOGICAL 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				