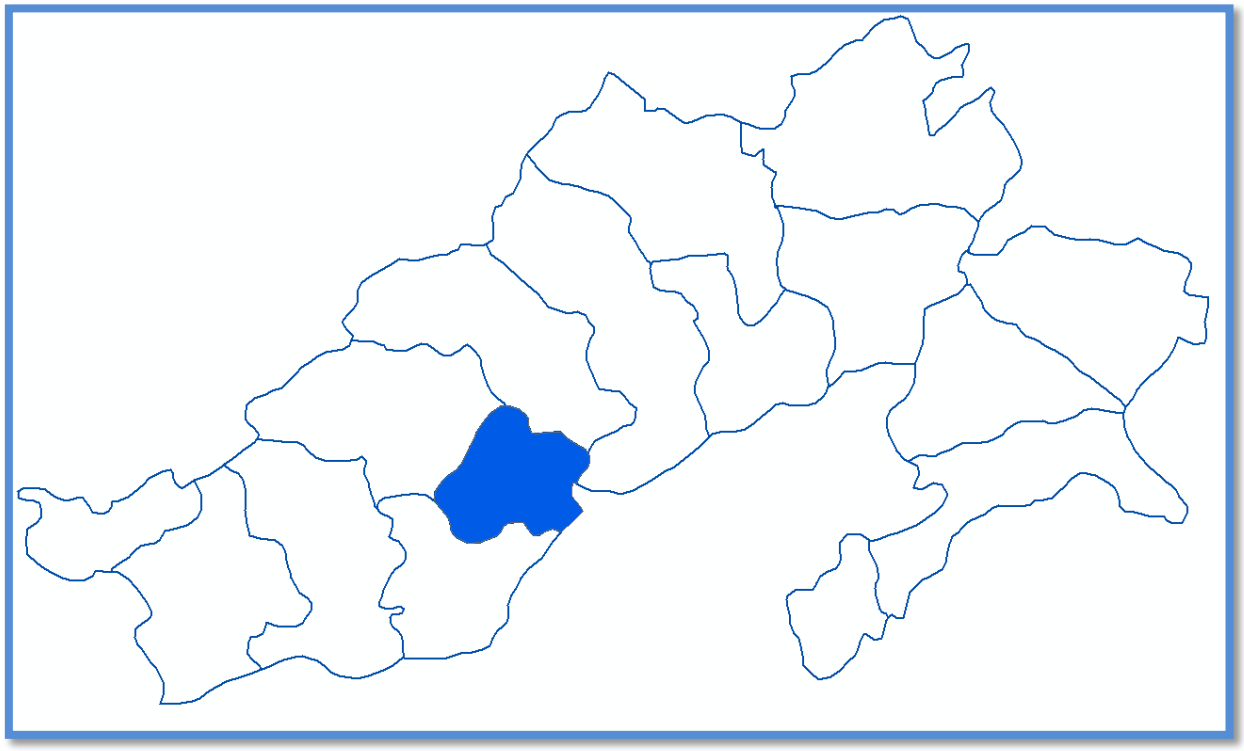
Technical Report Series: D

No:

Ground Water Information Booklet Lower SubansiriDistrict, Arunachal Pradesh



Central Ground Water Board

North Eastern Region

Ministry of Water Resources

Guwahati

September 2013

GROUND WATER INFORMATION BOOKLET
LOWER SUBANSIRI DISTRICT, ARUNACHAL PRADESH
DISTRICT AT A GLANCE

Sl. No.	ITEMS	STATISTICS
1.	GENERAL INFORMATION i) Geographical Area (sq.km.) ii) Administrative Divisions (as on 2011) Number of Block Number of village/Circle iii) Population (as per 2011 Census) iv) Average Annual Rainfall (mm)	 10,135 sq km 03 06 98244 1910
2.	GEOMORPHOLOGY i) Major Physiographic Units ii) Major Drainages (Sub-Dendritic to Sub -Angular)	 Mountaain plateau, lower hills . Kamala Subansiri
3.	LAND USE (sq. km.) a. Forest b. Ner area Sown c. Cultivable area	 2451.67 165.43
4.	MAJOR SOIL TYPES	Loamy sand , Loam,Clay loam
5.	AREA UNDER PRINCIPAL CROPS as on 2010 (sq.km.)	Rice 95.00
6.	IRRIGATION BY DIFFERENT SOURCES (sq.km.) Dug well Tube well Tank/Ponds Canals Net irrigated area Gross Irrigated area Other sources	N.A 6461 hect 6480 hect
7	Number of Ground water monitoring wells of CGWB (As on 31-03-2013) No of Dud wells No of Tube wells	 Nil Nil
8.	PREDOMINANT GEOLOGICAL FORMATIONS	Bondila Group
9	HYDROGEOLOGY i) Major water Bearing Formations ii) Pre- monsoon DTW iii) Post –Monsoon DTW	 Nil Nil Nil

10.	GROUND WATER EXPLORATION BY CGWB (as on 31.03.13)	Nil
11.	GROUND WATER QUALITY	Nil
11.	DYANMIC GROUND WATER RESOURCES (2009) in mcm. i) Net annual Ground Water Resources ii) Net Annual Ground Water Draft iii) Projected demand for Domestic and Industrial Use up to 2025 iv) Stage of Ground Water Development	 25.64 mcm 0.05 mcm 0.58mcm 0.217 %
12.	AWARENESS AND TRAINING ACTIVITY	Nil
13.	EFFORTS OF ARTIFICIAL RECHARGE AND RAINWATER HARVESTING	
	i) Projects Completed by CGWB (No & amount spent)	
	ii) Projects Under technical Guidance of CGWB (Numbers)	Nil
14.	GROUND WATER CONTROL AND REGULATION i) Number of OE Blocks ii) Number of Critical Blocks iii) Number of Blocks Notified	 Nil
15.	MAJOR GROUND WATER PROBLEMS AND ISSUES	Nil

GROUND WATER INFORMATION BOOKLET
LOWER SUBANSIRI DISTRICT
ARUNACHAL PRADESH

1.0 Introduction

Lower Subansiri district of Arunachal Pradesh constitutes of Lesser Himalayan zone of the Himalayan Range and covers 1,317 sq km area. It is located within North Latitude 26055' to 28021, and east longitude 92040' to 94021'. The district is surrounded by China (Tibet) and some part of Upper Subansiri District in the North, West siang some part pf Upper Subansiri district in east. Papumpare district and state of Assam in the South and east Kameng in the west respectively. Ziro is the district head quarter.

For better administrative control the district has been divided into two sub division (Ziro, Raga), three blocks (Ziro, Yachului, Raga).

As per 2011 census, the population of district is 98244 out of which 49542 are male and 48702 are female. SC and ST population of the district are 28 and 41619 respectively. Density of population is 42 / sq km.

Physiographically, the district can be broadly divided into three unit's i.e. lower hills, the plateau and mountain. The topography changes from lower hills in the south to lofty mountain extending northward. The hill ranges varies approx. from 1000 to 1600 m above MSL.

One of the main rivers of the district is Kamala. The origin of the river is fromsnow ranges of China Tibet). Which flow towards south east and meets the Subansiri Rver in Raga Circle, the Raga river drains area west of Yazail running through Kimin and join the river Brahamaputra in south. .

2.0 Rainfalls and Climate

The average annual rain fall in Ziro (HQ) is about 1910mm. In the mountainous district of lower Subansiri, climate is largely influenced by terrain condition and attitude. a year may be divided into four season a) cold weather season-Dec. to Feb. b). Mar. to May – Pre-Monsoon season of thunder storms, c).June to middle Oct.- the south west monsoon and d). Second half of Oct. to Nov.-Post –Monsoon period. In the foot hill or low high belt area of the district, the comparison to high belt area of the district, the climate is moderate in comparison to high belt area, where during winter is very cold and chilled while in summer it is pleasant. Dec. and Jan. is generally they are the coldest month and Jul. and Aug are the warmest months. The Maximum and minimum temperature is 24.4 to 9.7^0C at Ziro is Sub tropical and Temperature while climate of Raga, Yachuki and Palin is Sub tropical.

3.0 Geomorphology and soil type

3.1 Geomorphology

Lower Subansiri district is mainly constituted of NE-SW trending structural hills. The district is characterized by two fairly large intermontane valleys , Ziro and Tale valleys both in Ziro Circle both the valley are glacial originanothre unique feature of the district is highly dissected land underlain by the Ziro gneiss.

The soil have developed mostly on shales sandstone quartzite and phyllite in the hills . Soils of the piedmont valleys, uplifted terraces and river terrace have been developed on alluvial and colluvial materials washed down the hill s near the confluence of small and medium rivers. High and well distributed rain fall with thick vegetative cover have result of deep weathering of rock and given rise to very deep soils even on the hills slope. Soils is acidic in nature with high carbon content. The organic carbon content ranges from 0.11 % to 6.10% depth of soils varies from 12cm to 185cm.

5.0 Ground Water Scenario

5.1 Hydrogeology

Most of the district is occupied by hard and compact metamorphic rocks of pre-Cambrian to upper Paleozoic epochs. The unconsolidated alluvium sediments occupy the valleys located within the consolidated rocks. Hydro geologically the district broadly divided into the following hydro geological units as under.

CONSOLIDATED FORMATION-

It comprises the gneissic rocks of Sela and Bombdila groups Quartzites groups of Buxa and Miri Formation. The unit occupies more than 90% of the total area of thr district area. The rocks of the unit are intensity folded fractured and jointed. Minor fault are evident by cluster of discharging spring. The fractured and joints, along with weathered mantle, act as the zone for ground water storage. The ground water recharge is replenished annually by amount of precipitation. their ground water emerges out in the form of springs along the fracture at lower points the movement and storage of ground water is restricted by limited areas, with the result, the springs dry up during the lean period however perennial spring flow through out the year but their yield s decrease during dry season(March - April)

UNCONSOLIDATED FORMATION-

It comprises alluvial sediments of intermontane valleys. In general, the alluvial cover in these valleys surrounded by consolidated rocks is vary thin. Even small thickness of these sediments has good prospect for ground water development by shallow ground water structure. The surrounding hilly terrain recharges these valleys by their runoff and through the fractures, fissures and weak plains beneath their covers. Some of the intermontane valleys along with their ground water prospects are detailed as follows:-

1) ZIRO VALLEY:

The valley is located in Ziro-Hapoli area, covering about 15 Sq Km. It is underlain by weathered quartzites and gneissic metamorphic rocks of Page. The Kele river draining the valley runs longitudinally along north south direction. A number of stream and nalas from east to west join it. The valley filled comprises the sediments of silt, clay, weathered and broken pieces of gniessis and quartzite's. The western part of the valley has numerous springs and seepage. The water table rests within 3 m bgl around Ziro
Dug wells, 5 to 6 meter depth are feasible throughout the valley. The shallow tube ells of 25 to 30 meter depth in the alluvium around the Ziro and east of Hapoli town are expected to yield more than 20 m /hr. At present only a few dug wells are present in the valley. Geophysical survey should be carried out to demarcate the exact depth of the aquifer.

2) Yazali Valley:

It lies half way of Kimin-Ziro road. The valley is formed along the bank of Ranga river and occupies about 3 sq km area. The southern part is undulatory and boulder while the northern part is an alluvial plain. The main valley fills lies on north and north east along the Kele river is used for irrigation by Agricultural department at Yazali
Ground water occurs under water table condition. The depth of water table rests within 5 m bgl. Dug wells of 10 meter depth are expected to be feasible throughout the valley.
In Yazali valley geophysical survey and trial boring needs to be done to know the depth and extension of aquifer.

Apart from the valleys as mentioned above, there are small alluvial patches in the form of valleys scattered throughout the district, namely Sher, Joram etc. and cover about 0.5 to 1 sq. km area with thin veneer of alluvium.

4.2 GROUND WATER RESOUCES:

Adopting methodology as recommended by GEC 97, annual replenishable ground water resource of the district is 25.64 mcm. At present there is negligible ground water structure for any use and therefore total draft may be considered as negligible. Therefore stage of ground water development is 0%. Based on the net ground water availability, annual allocation of ground water supply for both domestic and industrial water supply for the foot hill and valley area is 0.58 mcm and ground water availability for future irrigation use is 2.72 mcm.

4.3 GROUND WATER QUALITY:

In general the PH value of the water is normal, sometimes slightly rising towards alkalinity. The electrical conductivity is moderate and within safe limits being 41 to 339 micromohos/cm. The water is soft and the constituents like Ca, Mg, Na, K, HCO etc are low. The high concentration of Sodium and chlorine in Hija dug well may be due to the well is unused and dirty. The water quality collected from dug wells and springs reveals that the water is most suitable for all purposes.

4.4 STATUS OF GROUND WATER DEVELOPMENT:

A few dug wells and a good number of springs are utilized in this district as a source of water supply for the villagers. As per GEC 97 methodology, no such recommendation put

forward for quantification of ground water development of springs which plays a vital role in the terrain like Arunachal Pradesh. As there is no other ground water structures available throughout the district, ground water development of the district may be considered as negligible or nil.

5. GROUND WATER MANAGEMENT STRATEGY:

As the district is mainly hilly terrain, springs are the major source of ground water and play an important role for domestic water supply. At present PHED, Arunachal Pradesh is utilizing the available springs with streams for the water supply in the township and villages. For irrigation purpose, a conjunctive use of surface as well as ground water is needed. Generally nearby streams or nalas are tabbed by the farmers and passes through the agricultural land. Recommendation for the conjunctive use of both ground water and surface water for the villages are given below:

Name of the village	Available cultivable land	Recommendation
Hawa camp	Western part of the village. 5 Ha cultivable land	Dug wells,10 m deep can be constructed.
Yazali	NE of the Bazar, both banks of the Kele river, 80 ha cultivable land.	By tapping small nalas in the uphill and diverting to paddy field by earthen channels. Dug well of 6 or more deep can be constructed.
Ziro valley	Around Saro villages of Hapoli (80 ha land), along eastern hill boundary(10 hac land) SW of Hapoli(5 ha land)	Dug wells 8 m deep or more around Hija. Expected yield is 5 m3/hr.
Joram	North of Joram village along the base of the hill, south of the Joram proper(80 ha cultivable land)	Large dia dug well, arrest the nala flow uphill.

5.1. WATER CONSERVATION AND ARTIFICIAL RECHARGE:

Artificial recharge need not required for this area. A few roof top rain water harvesting structure may be constructed in these building etc area as a trial basis to observe the acceptance of roof top rain water by the common people. On success, such more structures may be constructed.

6.0. GROUND WATER RELATED ISSUES AND PROBLEMS:

Nil.

7.0. Awareness and training activity:

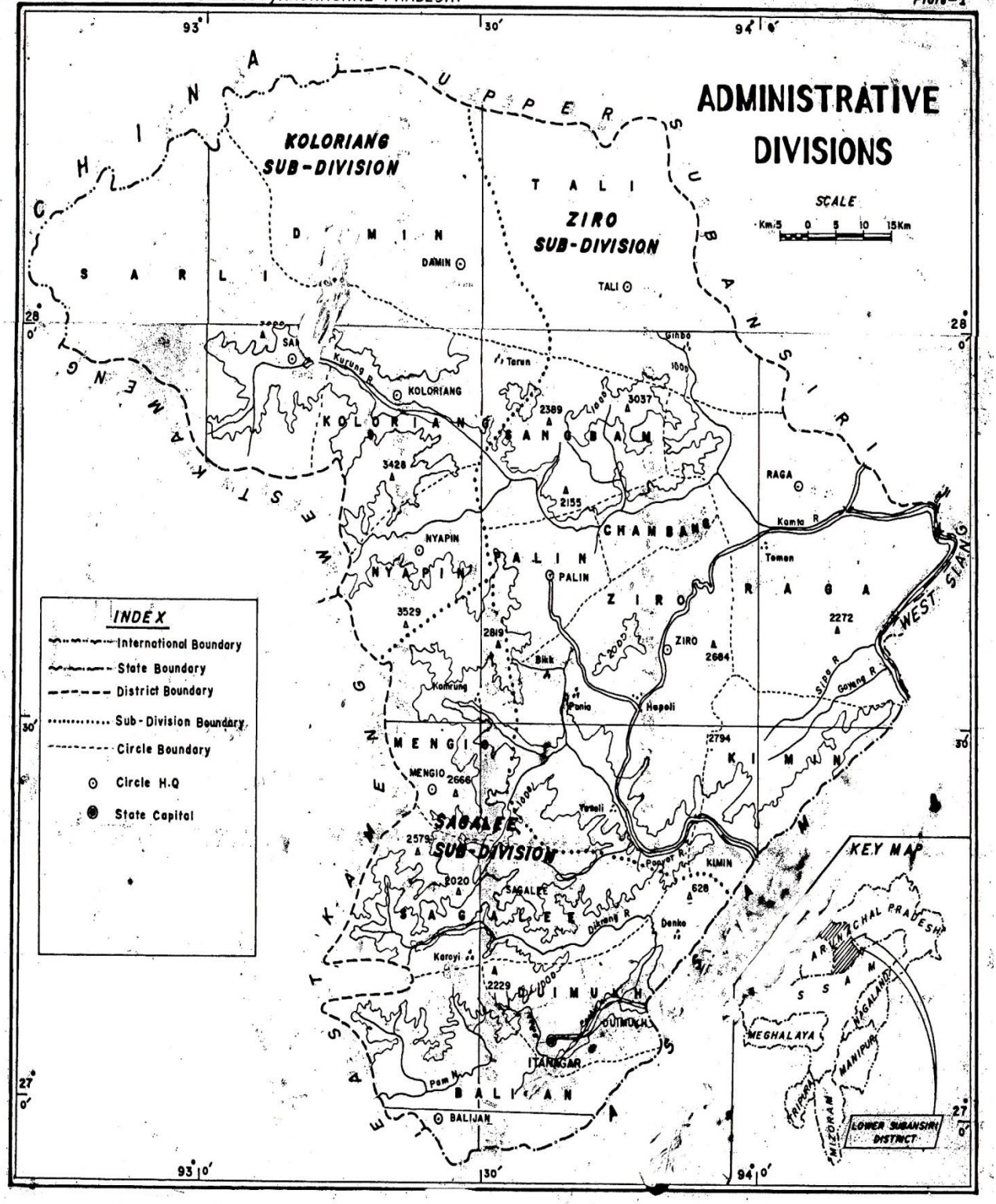
7.1. Mass awareness ---------- Nil
7.2. Participation ---------- Nil

8.0. Areas notified --------- Nil

9.0. RECOMMENDATION:

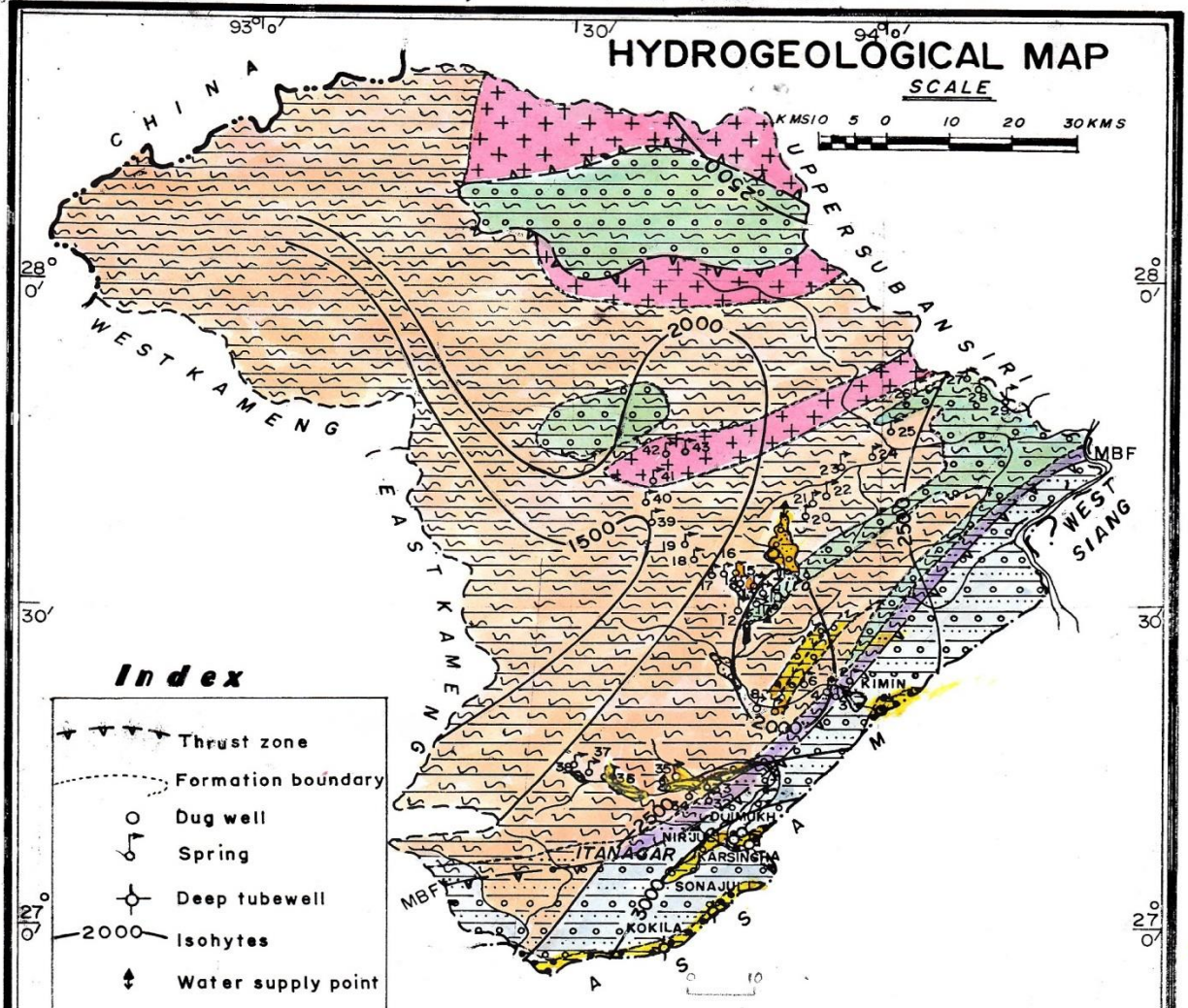
1) Large dia dug well are feasible/suitable in the valley areas nearby streams.
2) Water from rivers and streams flowing the valleys should be used for irrigation by lifting with centrifugal pumps. Construction of small check dams in the perennial streams may be done for diversion of water in paddy field can be done.
3) Shallow tube wells 25 to 30 m depth in the alluvium around Ziro and east of Hapoli may be constructed. Expected yield will be more than 20 m3/hr.
4) Development of springs.
5) Artificial recharge need not required for this area. A few roof top rain water harvesting structure may be constructed in the school, office building etc area as a trial basis to observe the acceptance of roof top rain water by the common people for their day to day use. On success, more such structures may be constructed.

LOWER SUBANSIRI DISTRICT, ARUNACHAL PRADESH. Plate-I



LOWER SUBANSIRI DISTRICT, ARUNACHAL PRADESH

HYDROGEOLOGICAL MAP



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- Thrust zone
- Formation boundary
- Dug well
- Spring
- Deep tubewell
- 2000 — Isohytes
- Water supply point

Legend

AGE		FORMATION	LITHOLOGY	AQUIFER DISPOSITION	GROUND WATER POTENTIAL.
RECENT	Un-Consolidated	Alluvium / Piedmont.	Sand, pebble, silt and clay of alluvium and Piedmont zone comprising alluvial fan materials of course sand and boulder with irregular clay bands.	Discontinuous, unconfined to confined aquifers with moderate thickness.	Feasible for dugwells and hand pumps, S/T with yield prospect of 20 m^3/hr. Feasible for S/T, Deeptube wells with yield prospect of 30 m^3/hr.
MID MIOCENE TO UPPER PLEISTOCENE	SEMI-CONSOLIDATED	Siwalik Formation	Boulder, pebble, sand stone and siltstone with coal seams.	Continuous, unconfined aquifers with limited thickness	Large diameter dug wells with yield prospect of 6-8 m^3/hr.
PERMIAN	CONSOLIDATED	Gondwana Group.	Sandstone, carbonitic rous shales with fossils and shales.	Discontinuous, rectricted to weathered mautle fracture and joints.	Large diameter dugwells with yield prospect of 1 to 2 m^3/hr. in depressed areas. Development of spring etc.
LOWER PALEOZOIC		Miri and Buxa Formations.	Orthoquarzite with conglomerate, purple shales Quarzite-carbonate-phyllite association.		
EARLY PALEOZOIC		Bomdila Group	Low to medium grade metamorphics.		
PRE-CAMBRIAN.		Sela Group	High grade metamorphics, gneisses, schist and Lit/perlit granite gneiss.		

GEOLOGY AFTER G.S.I.