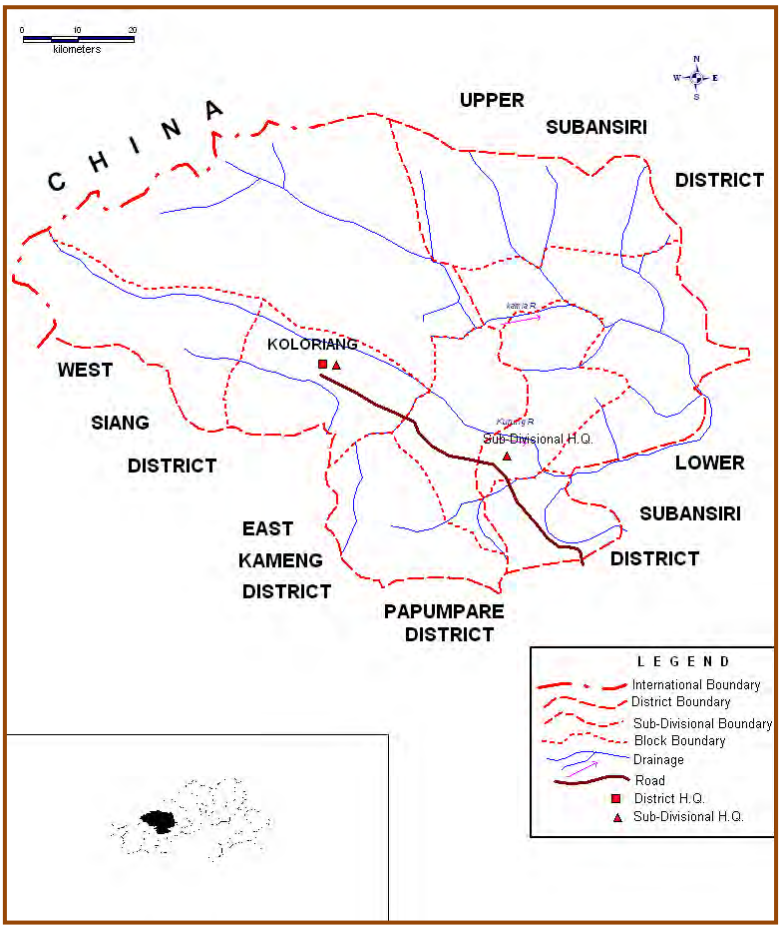
Technical Report Series: D

No: 24/2009-10

Ground Water Information Booklet

Kurung Kumey District, Arunachal Pradesh



Central Ground Water Board

North Eastern Region

Ministry of Water Resources

Guwahati

August 2009

GROUND WATER INFORMATION BOOKLET
KURUNG KUMEY DISTRICT, ARUNACHAL PRADESH

AT A GLANCE

Sl No.	ITEMS	STATISTICS
1.	GENERAL INFORMATION	
	i) Geographical area (sq.km)	8818
	ii) Administrative divisions (Sub-division) (As on 2006)	2
	Number of blocks	9
	Number of circles	12
	iii) Population (As on 2001 Census)	42,518
2.	GEOMORPHOLOGY	
	Major physiographic units	Hilly Gneissic Complex, Low weathered hills
	Major drainages	Kamla River and Kurung River
3.	LAND USE	Major part of the district 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.
	a) Net area sown	19042 ha
	b) gross cropped area :	21489 ha
4.	MAJOR SOIL TYPES	Red sandy soil and skeletal soil
5.	AREA UNDER PRINCIPAL CROPS (As on 2005-06)	8370 ha
6.	IRRIGATION BY DIFFERENT SOURCES (Areas and Numbers of Structures)	
	Canals	NA
	Other sources	NA
	Net irrigated area	NA
	Gross irrigated area	NA
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	Gneissic Complex and metamorphic of Precambrian and Palaeozoic age.
9.	HYDROGEOLOGY	

	➢ Major water bearing formation	Consolidated formations of Precambrian and Palaeozoic age. 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 31-03-2007)	
	No. of wells drilled (EW< PZ< SH< Total)	Nil
11.	Presence of chemical constituents in more than permissible limit	Nil
	Type of water	Fresh and potable
12.	DYNAMIC GROUND WATER RESOURCES (2004) IN MCM	
	Stage of Ground Water Development	**Safe**
13.	AWARENESS AND TRAINING ACTIVITY	
	Mass Awareness Programmes organized	Nil
	Water Management Training Programmes organized	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
KURUNG KUMEY DISTRICT, ARUNACHAL PRADESH

1.0 INTRODUCTION

The Kurung Kumey district lies between North latitudes 27° 33′ and 28° 19′ and East longitudes between 92° 42′ and 94° 03′. The district has a international boundary with Tibet (China) in the North and bounded by Lower Subansiri and Papumpare districts in the south, West Kameng and East Kameng districts in the West and Upper Subansiri district in the East. This district was created in April, 2001. The total geographical area of the district is 8818 sq.km.

The district is divided into two sub-divisions, nine blocks and twelve circles. The district Headquarters is situated at Koloriang. The river system of the district is a part of the Subansiri river sub-basin. The prominent rivers are Kamla River and Kurung River. Both the rivers flow in the south-easterly direction. The drainage pattern is generally dendritic to sub-parallel in nature and follows the geomorphological trends of the hills and mountains. Most of the rivers and streams are perennial. In the hilly terrain, the rivers have deep narrow gorges along their courses. Both the rivers are tributaries of the Subansiri River.

Agriculture is the mainstay of the people. The agriculture of the district mainly depends on monsoon rainfall. However, the Government of Arunachal Pradesh is actively engaged in developing permanent cultivation in the low lying areas along the valleys patches of hill slopes and intermontane valleys. Both terraced cultivation and jhum (shifting) & tillage (in which tracts are cleared by burning and sown with mixed crops) are practised. There are no major industries in the district.

2.0 RAINFALL AND CLIMATE

Annual rainfall in the district varies from 800 to 1200 mm. Most of the rainfall is received during the monsoon period (June to September).

The climate of the district is largely influenced by the nature of its terrain. 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.

3.0 GEOMORPHOLOGY AND SOIL TYPE

Two third of the district constitutes high mountain ranges falling in the Higher Himalayan zone. The northern part of the district is mostly devoid of vegetation, due to heavy snowfall during winter season. The valley area is found along the river Kamla and Kurung. The district is covered by hard rock terrain and the extreme northern part is snow bound. The drainage density is moderate to low. On the regional scale, the drainage pattern is angular to sub-angular.

The entire district is hilly mountainous terrain. The hills and mountains have NE-SW or NW-SE trend. The narrow and elongated valleys are topographic depressions between hill

ranges. Geomorphology of the district may be divided into two major geomorphological units which are as follows.

a) Denudo-structural Hills

These are mainly comprised of low to high grade metamorphic, gneissic and schistose rocks. The hills are high with steep slopes. Around 95% of the total geographical area of the district is occupied by this unit. This unit acts as run-off zone.

b) Valley fills

Within the hill ranges, a few valley fills occurs with limited area extent. These are covered by recent alluvium. This unit acts as good recharge zone.

3.2 Soil Types

The nature and properties of soil vary with the area. The soils of the valleys are generally loamy or sandy loam mixed with coarser soil particles. Soil in greater part of the district is red sandy soils and skeletal soils. In the forested regions, the soil generally contains high humus and nitrogen due extensive cover of forests. Soils of the mountains are relatively lacking in organic materials. The soil of this category is reddish in colour and acidic in nature. 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 soil of the valleys is favourable for cultivation of Khariff and Rabi crops. The soils of the hills are suitable for shifting cultivation of paddy, maize etc.

4.0 GROUND WATER SCENARIO

4.1 Hydrogeology

Major part of the district is occupied by consolidated formation of Bomdila and Sela Group.

The consolidated formations forming the Sela and Bomdila Group include the high and moderate hill ranges and occupy more than 95% of the total area. These formations are mostly comprised of high grade metamorphic and gneissic and schistose rocks and fissured formations (phyllite, schist, quartzite etc.) belonging to Archaean and Palaeozoic age. The rocks of this unit are very hard and compact with steep slopes and escarpments. They act basically as run-off zone and have 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 limited amount of ground water in this area comes out through the weaker planes in the form of springs. The discharge of the springs in gneissic rocks was found to be 32 to 64 m^3/day. In the schistose rocks, the discharges were found to be 14 to 17 m^3/day and in quartzite, it is 10 to 43 m^3/day. Spring discharge in gneissic rocks was found to be more due to presence of more fractures and joints.

The unconsolidated Quaternary sediments occupy the small valley areas. They are distributed as thin layers in intermontane valleys. The area covered by unconsolidated formation is insignificant as compared to consolidated formation. 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.

Kurung Kumey 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 6.5 and 8.02. Electrical conductivity of the water is found to vary from 18-486 micromhos/cm at 25^{O}C. The concentration of fluoride ranges from 0.7 to 0.44 ppm. The range of concentration of calcium and magnesium is in between 2 and 54 and 1 and 22 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 can safely be used for domestic and industrial purposes.

4.4 Status of Ground Water Development

The entire district is covered by hills of consolidated rocks. The rock types are mostly comprised of metasediments like gneissic and schistose rocks and fissured formations (phyllite, schist, quartzite etc.). These rocks are very hard and compact. The scope for ground water storage is limited mostly to secondary porosities like cracks, joints, fissures etc. These weaker planes, at places, aided with thickness of weathered zone and slope factor, may yield sufficient amount of ground water. 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 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 and clearing at the openings. Rain water harvesting which is well known to the people of the district can also be adopted for solving the scarcity of potable water. Large diameter dug wells are also recommended in the valley areas which may provide sufficient water for domestic purposes.

5.1 Rainwater harvesting structures constructed under centrally sponsored scheme

Nil.

6.0 AWARENESS AND TRAINING ACTIVITY

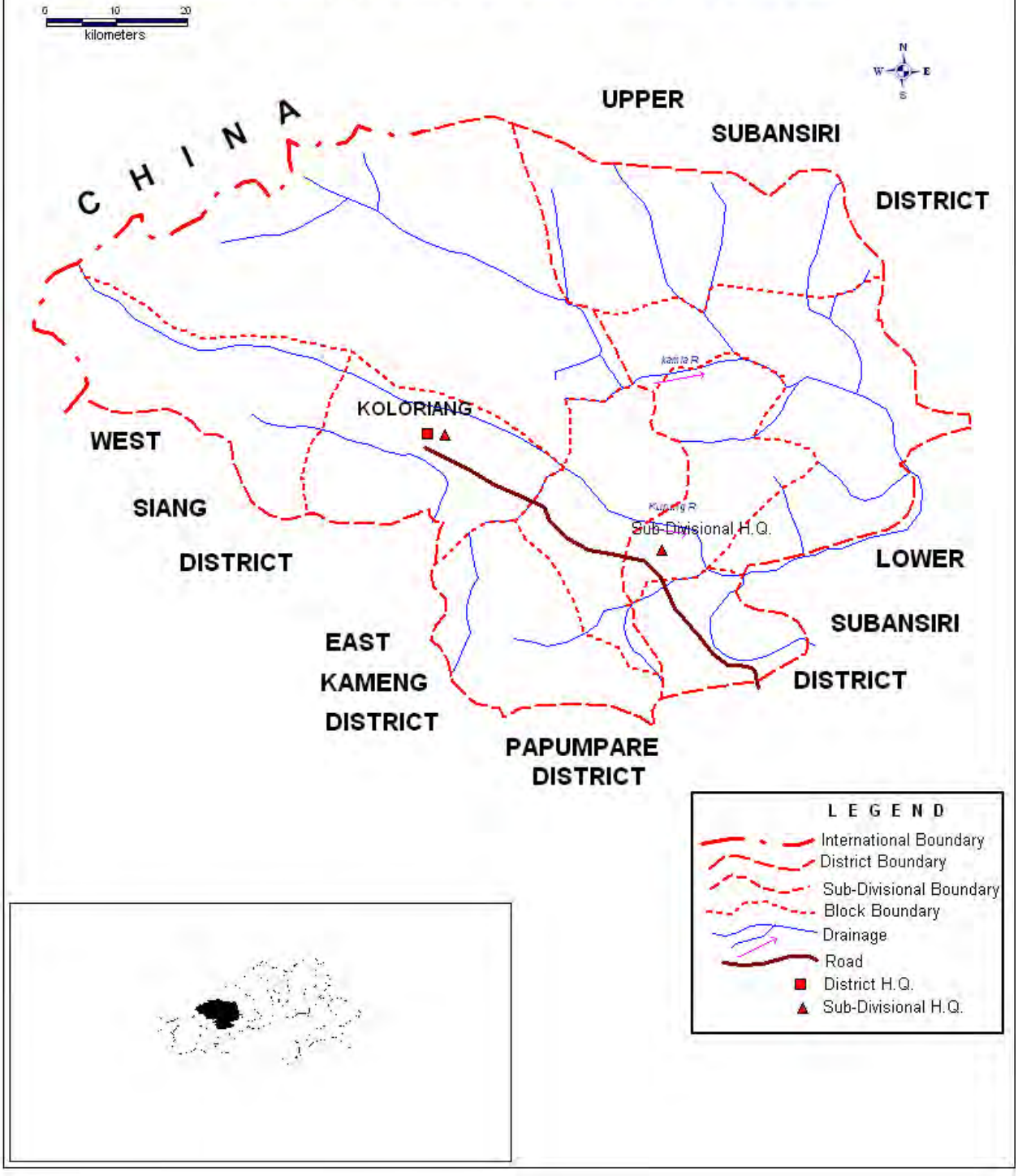
6.1 Mass Awareness Training Programme

Nil.

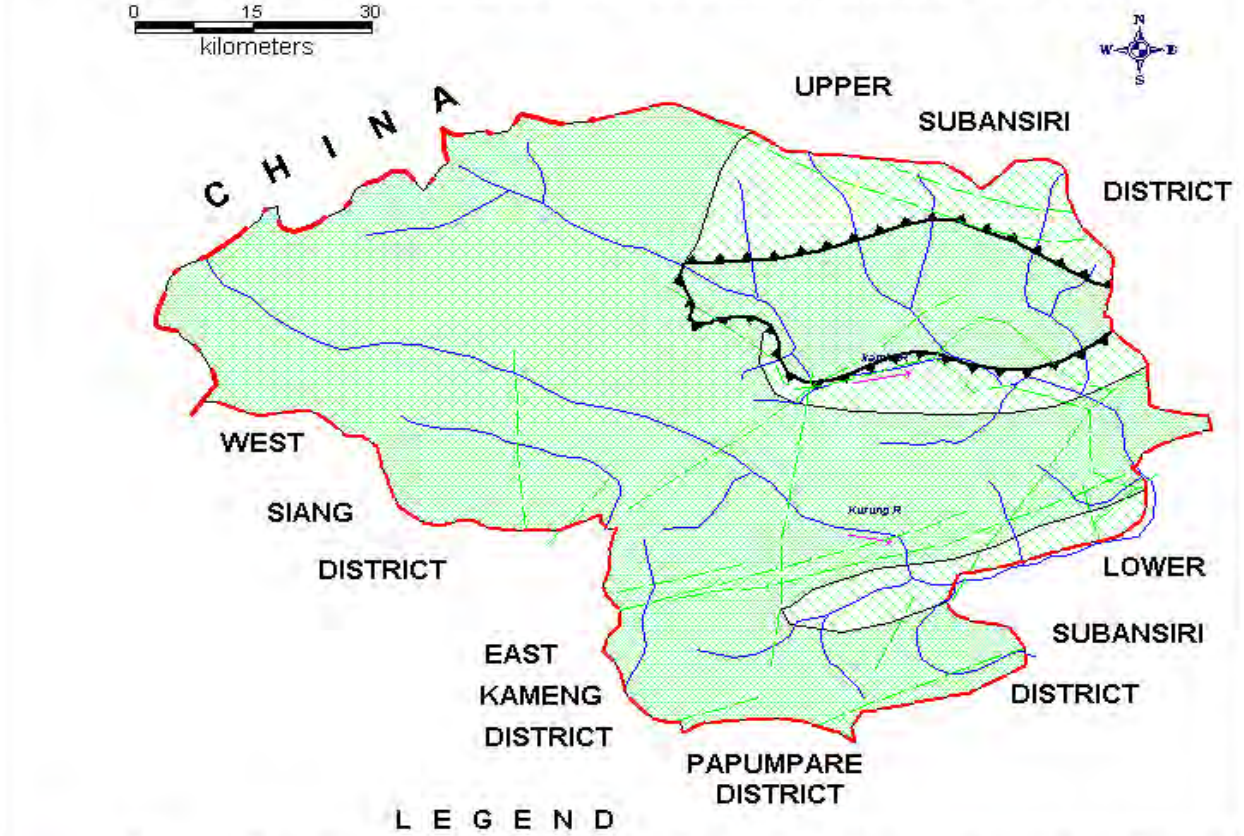
7.0 RECOMMENDATIONS

Existing hydrogeological set up indicates the limited ground water development prospects. From the hydrogeological point of view, the entire area of the district can be classified into consolidated formation. Ground water prospect is very much limited in this unit and is confined mainly to secondary porosities developed due to joints, fractures etc. In this unit the only source of development of ground water is through springs. The perennial springs may be developed by constructing sumps with concrete and widening the joints and fractures, if necessary, the sumps or the collector structure should be well protected from surface contamination. Surface water may be tapped in areas where ground water development is not feasible. However, rain water harvesting technique may be practised to meet the requirement.

ADMINISTRATIVE MAP OF KURUNG KUMEY DIASTRICT, ARUNACHAL PRADESH



HYDROGEOLOGY OF KURUNG KUMEY DISTRICT, ARUNACHAL PRADESH



L E G E N D

Age	Formation	Lithology	Aquifer disposition	Ground Water Potential
Lower Palaeozoic	Bomdila Group	Low to medium grade metamorphics	Discontinious, restricted to weathered mantle, fracture and joints	Large diameter dug wells with yield prospect of 1 to m3/hr in depressed areas.Development of springs.
Precambrian	Sela Group	High grade metamor-phics, gneisses, schist, lit per lit granite gneiss.	Discontinious, restricted to weathered mantle, fracture and joints	Large diameter dug wells with yield prospect of 1 to m3/hr in depressed areas.Development of springs.

Thrust
Lineament