

GROUND WATER INFORMATION BOOKLET KOCH BIHAR DISTRICT, WEST BENGAL

DISTRICT AT A GLANCE

Sl. No.	Items	Statistics
1.	GENERAL INFORMATION	
	i) Geographical Area (Sq.km.)	3387.0 Sq.km
	ii) Administrative Division (as on 2001)	
	• No. of Subdivision	6
	• No. of Blocks	12
	• No. of Municipalities	5
	• No. of inhabited villages	2210
	iii) Population (as on 2001 Census) (With density of population)	24,79,155 (732 sq.km.)
	iv) Normal Annual Rainfall	3067 mm
2.	GEOMORPHOLOGY	
	i) Major Physiographic Unit	1. <i>Bhabar</i> , 2. <i>Terai</i>
	ii) Major Drainages	Rivers Tista, Torsa, Jaldhaka and Raidak
3.	LAND USE (As on 2004-05)	
	i) Forest Area	4.26
	ii) Net Area Sown	254.16
4.	MAJOR SOIL TYPES	Red sandy and loamy soil, lateritic soil and younger Alluvial soils.
5.	AREA UNDER PRINCIPAL CROPS (As on 2004-05) (Sq.km)	Total Cereals : 289.8 Total Pulses: 8.0 Total food grains: 297.7 Total oil seeds: 30.1
6.	IRRIGATION BY DIFFERENT SOURCES (as on 2004-05) (Areas & No. of Structures)	
	Dug wells (date till 2004-05)	1.612 sq.km. area irrigated through 6480 of dug wells.
	Shallow Tube wells (date till 2004-05)	12.399 sq.km. area irrigated through 39687 of tube wells.
	Deep Tube Wells (date till 2004-05)	182.96 sq.km. area irrigated through 7434 of schemes.
	Surface Lift (date till 2004-05)	175.80 sq.km. area irrigated through 8760 of schemes.

	River Lift Irrigation (date till 2004-05)	3.554 sq.km area irrigated through 321 nos.
	Tank (date till 2004-05)	14.44 sq.km. area irrigated through 1762 nos. of tanks.
	Canals	1.21 sq.km. area irrigated through Govt. Canals.
	Gross Irrigated area	392.065 sq.km.
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (as on 31.03.2007)	
	i) Dugwells	31
	ii) Piezometers/Tubewells	Nil
8.	PREDOMINANT GEOLOGICAL FORMATIONS	Recent or Quaternary alluvium
9.	HYDROGEOLOGY	
	i) Major Water Bearing Formation	Quaternary alluvium
	ii) Pre-monsoon depth to water level during 2006	1.20 to 6.55 m bgl in Dug wells.
	iii) Post-monsoon depth to water level during 2006	0.56 to 7.05 m bgl in Dug wells.
	iv) Long term water level trend for last 10 years.	Declining trend of water level to the tune of 0.01 to 0.4 m/yr., and rising trend to the tune of 0.01 to 0.18 m/yr.
10.	GROUND WATER EXPLORATION BY CGWB (as on 31.3.07)	
	i) Number of wells drilled	1
	ii) Depth range	Maximum depth drilled 243.5 bgl
	iii) Discharge	-
	iv) Transmissivity (m ² /day)	-
	vi) Storativity (S)	12
11.	GROUND WATER QUALITY	
	i) Presence of chemical constituents more than permissible limit	IRON
	ii) Type of water	Ca-Mg-HCO ₃
12.	DYNAMIC GROUND WATER RESOURCES (MCM)	
	i) Net Annual Ground Water Availability	2085.76
	ii) Existing Ground Water Draft for All uses	347.82
	iii) Projected Demand for Domestic & Industrial uses after 25 years	50.06

	iv) Stage of Ground Water Development	18.57%
13.	AWARENESS AND TRAINING ACTIVITY	
	i) Number of Mass Awareness Programme organized	Nil
	ii) Number of Water Management Training Programme organized	Nil
14.	EFFORTS OF ARTIFICIAL RECHARGE AND RAIN WATER HARVESTING	
	i) Projects completed by CGWB	Nil
	ii) Projects under technical guidance by CGWB	Nil
15.	GROUND WATER CONTROL AND REGULATION	
	i) No. of over-exploited blocks	Nil
	No. of Critical Blocks	Nil
	No. of Blocks notified	Nil
16.	MAJOR GROUND WATER PROBLEMS AND ISSUES	1. Iron conc. In ground water beyond permissible limit.

GROUND WATER INFORMATION BOOKLET KOCH BIHAR DISTRICT, WEST BENGAL

1.0 INTRODUCTION

Administrative Details

Location and area	The district is bounded by the latitude 26°32'20" N to 25°57'40" and Longitude 89°54'35" E to 88°47'40" E. The total geographical area of the district is 3387 sq.km. It has 5 Sub-divisions consisting of 12 blocks, 12 Panchayat Samities. The total police station is 11. There are 128 Gram Panchayats with 1714 villages. Koch Bihar is the headquarters of the district.
Ground Water basin	The district is located in the Tista and Torsa basin.
Drainage	The Tista & The Torsa with tributaries/distributaries namely the Raidak.
Irrigation Practices	The cultivation is done mainly by groundwater alongwith the surface water from canals, tanks and river.
Studies of CGWB	CGWB has completed systematic Hydro geological survey and continuation of Groundwater Management Studies. Apart from this Groundwater Exploration is being carried out to delineate the aquifer characteristics. Special attention has been given to identity the deeper aquifer.

2.0 Rainfall & Climate

Rainfall	The normal rainfall is of the tune of 300 mm.
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Climate	The district is characterized by moderate humid climate with heavy rainfall. It receives adequate rainfall from South-West monsoon, which sets in the later half of June and withdraws by the middle of October. Pre-monsoon rains are received during March-April. Maximum and minimum temperature as recorded are 36°C and 06°C.
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3.0 Geomorphology & Soil Types

Geomorphology	The district is divided into two (2) geographic units <ol style="list-style-type: none"> 1. Newer Alluvium 2. Older Aluvium
Drainage	The main rivers are Tista, Jaldhaka, Torsa and Raidak.
Soil	Soil in the area is mostly sandy to clayey alluvial soils. Sandy loam being prevalent in the areas. In the northeastern corner of the area, i.e., in the Toofanganj block, brown soils are found to occur in the higher altitude. Soils are acidic in nature (pH - 4.2 to 6.2) and the organic matter in decomposed state.

4.0 Geology

The district is entirely underlain by Quaternary alluvium laid down by the South-flowing mountainous streams and rivers. No older alluvium formations have been found anywhere of the district within the explored depth of 304 m bgl. It is likely that Siwaliks and other Tertiary sequences, if present, occur below this depth.

Sub-Surface Geology – The alluvial deposits in this district have been laid down as flood-plains deposits by the torrential mountainous streams and rivers. The sediments comprise boulder, pebbles, gravels and coarse to medium sand intercalated with lenses of clay. The sediments in the northern part of the district are poorly sorted, but the assortment improves slightly towards the south. The boulders (of size 30 cm or more), pebbles and gravels are well rounded and are derived mainly from the Precambrian Daling quartzites, granites, etc. The sands and coarse to fine, sub-rounded and micaceous (muscovite).

5.0 GROUND WATER SCENARIO

5.1 Hydrogeology

Groundwater occurs under both water table and confined conditions in aquifers in depth ranges from 2.5-304 m bgl; the shallow aquifer being tapped by dug wells while the deeper aquifers are tapped by medium to heavy duty tube wells. Groundwater is generally being developed through open wells i.e., dug wells, in the weathered zone and the development and the available discharges can only meet the domestic needs but is not sufficient enough for any large scale development of ground water. However, groundwater in the zone of semi-confined to confined aquifers can yield 80 – 170 lpm; which at places goes as high as 350 lpm. There is scope for development of ground water through tube well.

Depth to water level in pre-monsoon period (2006) varies from 2 to 5.00 m bgl., whereas that post-monsoon is from <2.00 to 5.00 m bgl.

5.2 Groundwater Resources

The dynamic ground water resources of Koch Bihar district has been estimated jointly by CGWB and SWID, govt. of West Bengal following the norms laid down by GEC 1997 methodology and projected as on 31.02.04.

The reconciled figures are as under –

Total Ground Water Resources	231636 ham
Net Ground Waster Availability	208499 ham.
Existing Ground Water Draft for all uses	34782 ham
For irrigation	31081 ham
For domestic and Industrial water	3701 ham
Stage of Ground Water Development	18.57%
Allocation for domestic & Industrial water supply requirement upto 25 years	5006 ham
Net groundwater Availability for future irrigation development	172412 ham
Categorization of blocks	All blocks are categorized under "Safe"

5.3 Ground Water Quality

The chemical quality of ground water in the area is slightly acidic to slightly alkaline, the pH varying between 6.5 – s7.8. The specific conductance varies from 66-599 $\mu\text{s}/\text{cm}$ at 25°C. All the waters are of bi-carbonate type; i.e., the bi-carbonate content varying from 40-510 ppm. The Chloride content varying from 35-105 ppm. Iron content in water generally varies from 0.04 – 10.2 ppm. The high content of iron in water may need removal before use both agricultural and domestic purposes. Fluoride in water varies from 0.12 – 0.37 ppm and as such does not create any hazard.

Thus, the chemical quality of ground water in shallow and deeper aquifers is fresh and good for both domestic and agricultural purposes.

5.4 Status of Ground Water Development (Blockwise)				
Block	Occurrence of Aquifers & its potentiality (as per data available with CGWB)	Feasibility of GW Abstraction Structures	Ground Water Resource Available & Status of GW Development (as on March, 2004)	Remarks
1	2	3	4	5
Koch Bihar I	Multiple aquifer system occurs in general of 4-165 m bgl, beyond the depth of Bhabar/Siwalik zones. T of the aquifers is about 3100 m ² /d.	Low duty (30-40 m ³ /hr) and heavy duty 125-250 m ³ /hr) tube wells are generally feasible.	Net GW availability 26971.95 ham. Irrigation draft (project up 2004)) : 4076.75 ham. No. of irrigation well (as per census 2001) STW:750; HDTW:2; Dug well. Category of Block: Safe	Groundwater Development may be done in planned manner.
Koch Bihar II	In general the depth span of 6-120 m bgl T about 2000 m ² /d	Low duty (25-40 m ³ /hr.) and heavy duty (100-175 m ³ /hr)Tubewells are generally feasible.	Net GW Availability 26497 ham. Irrigation draft (project up 2004): 3014.97 STW: 675; DTW: 7, Dug Well: 960.Category : Safe	Safe category, Iron presence in Shallow Tubewells.
Dinhata I	In general the depth span of 4-120 m bgl T about 3400 m ² /d	Low duty (30-40 m ³ /hr.) and heavy duty (100-150 m ³ /hr)Tubewells are generally feasible	Net GW Availability 18530 ham. Irrigation draft 3724 STW: 1050; HDT: 12, RLI: 12.Category : Safe	Ground Water Development may be done in planned manner. Safe Category
Dinhata II	In general the depth span of 3.5-130 and 160-190 m bgl T about 3500 m ² /d	Low duty (30-45 m ³ /hr.) and heavy duty (100-160 m ³ /hr)Tubewells are generally feasible	Net GW Availability 8385 ham. Irrigation draft 3002 STW: 850; HDT: 11, RLI: 20.Category : Safe	Safe category, Iron presence upto 60 m bgl mostly in Shallow Tubewells.
Haldibari	Multiple aquifer encountered in the depth of 6-80 m bgl and 110-196 m bgl T about 2800 m ² /d	Low duty (30-45 m ³ /hr.) and heavy duty (100-150 m ³ /hr)Tubewells are generally feasible	Net GW Availability 10561 ham. Irrigation draft 962 STW: 575; HDT: 5 Dug: 540 Category : Safe	Ground Water Development may be done in planned manner. Safe Category.

Block	Occurrence of Aquifers & its potentiality (as per data available with CGWB)	Feasibility of GW Abstraction Structures	Ground Water Resource Available & Status of GW Development (as on March, 2004)	Remarks
1	2	3	4	5
Mathabhanga I	In general the depth span of 4-120 and 165-196 m bgl T about 3000 m ² /d	Low duty (30-40 m ³ /hr) and heavy duty 100-150 m ³ /hr) Tube wells are generally feasible.	Net GW availability 22583 ham. Irrigation draft 2147 ham. STW: 620; HDT: 4 Dug: 720 Category : Safe	Groundwater Development may be done in planned manner. Safe Category
Mathabhanga II	Multiple aquifers in the depth 6-80 m bgl and 116-200 m bgl. T about 2600 m ² /d	Low duty (30-45 m ³ /hr) and heavy duty 100-150 m ³ /hr) Tube wells are generally feasible	Net GW availability 22925 ham. Irrigation draft 3799 ham. STW: 900; HDT: 6 Dug: 1150 Category : Safe	Groundwater Development may be done in planned manner. Safe Category.
Mekhliganj	In general the depth span 4-120 and 160-194 m bgl T about 3000 to 3200 m ² /d	Low duty (30-40 m ³ /hr) and heavy duty 100-150 m ³ /hr) Tube wells are generally feasible.	Net GW availability 20330 ham. Irrigation draft (Project upto 2004) 1012 ham. Number of Irrigation well (as per 2001 census) STW: 750; HDT: 8 Dug: 650; RLI : 2 Category : Safe	Groundwater Development may be done in planned manner.
Sitai	In general the depth span 6-80 and 110-190 m bgl T about 3200 m ² /d	Low duty (30-45 m ³ /hr) and heavy duty 120-160 m ³ /hr) Tube wells are generally feasible.	Net GW availability 10786 ham. Irrigation draft (Project upto 2004) 1048 ham. Number of Irrigation well STW: 640; HDT: 2 Dug: 550; Category : Safe	Safe category. Iron presence in shallow tubewells.
Sital Kuchi	Multiple aquifer encountered in the depth of 6-80 m bgl and 110-200 m bgl T about 2800 m ² /d	Low duty (30-45 m ³ /hr) and heavy duty 100-150 m ³ /hr) Tube wells are generally feasible	Net GW availability 7767ham. Irrigation draft 2258 ham. Number of STW: 700; HDT: Nil; Dug: 600; Category : Safe	Groundwater Development may be done in planned manner. Safe Category.

Block	Occurrence of Aquifers & its potentiality (as per data available with CGWB)	Feasibility of GW Abstraction Structures	Ground Water Resource Available & Status of GW Development (as on March, 2004)	Remarks
1	2	3	4	5
Tufanganj I	In general the depth span 3.5-120 and 160-210 m bgl T about 3000 m ² /d	Low duty (30-45 m ³ /hr) and heavy duty 100-140 m ³ /hr) Tube wells are feasible	Net GW availability 14707 ham. Irrigation draft 3718 ham. Number of STW: 565; HDT: 1; Dug: 440; Category : Safe	Groundwater Development may be done in planned manner. Safe Category.
Tufanganj II	Multiple aquifer in the depth of 4-80 m bgl and 110-180 m bgl T about 3000 m ² /d	Low duty (30-45 m ³ /hr) and Heavy duty 120-240 m ³ /hr) Tube wells are feasible	Net GW availability 18472 ham. Irrigation draft 2315 ham. Number of STW: 1056; HDT: 6; Dug: 760; RLI: 2 ; MDTE: 5 Category : Safe	Groundwater Development may be done in planned manner. Safe Category.

6.0 GROUND WATER MANAGEMENT STRATEGY

6.1 Groundwater Development:

At present groundwater development in the district is mainly controlled by the Dugwells and shallow tube wells along with some deep tube well, which are very less in number. As per Groundwater Estimation Committee 1997, the total groundwater resources thus calculated about 231666 m ham.

Estimation of ground water has been calculated based on the data of shallow tube wells tapping the unconfined aquifers only. But there are insufficient number of deep tube wells existing in the district tapping the confined aquifers which are being utilized for pipe water supply and irrigation also. Thus development through deeper aquifer may be taken up by constructing deep tube wells.

6.2 Water Conservation & Artificial Recharge:

No structure has been constructed by CGWB so far in the district.

7.0 Ground Water Related issues and problems:

- i) In the area ground water occurs under water table condition in the weathered zones (5 to 10 m thick) as well as semi-confined to confined conditions. Drilling of deep tube wells in the northern part of the area is to be carried out by percussion rig only, while southern part of the district, direct rotary drilling rigs may be employed. During installation of tube wells, proper care should be taken to see that the well-sorted water bearing sand gravel layers are screened avoiding the poorly sorted layers.
- ii) Water logged areas: Water logging problem have been observed in parts of Dinhata-II and Sitai Blocks.

- iii) Ground water Quality problem: Though chemically the water in the district is good for domestic purposes, yet in some localized pockets, the iron and Fluoride content may be too high and may need removal before human consumption.
- iv) Risk to Natural disasters (a) Natural erosion along the banks of the Tista and Torsa Rivers causing huge loss of agricultural and residential land specially in rainy season is a serious problem in the blocks beside the river banks.
- v) All groundwater development projects should aim at optimum utilization of groundwater resources of the district. A close check should be kept on over-exploitation or excess withdrawal of groundwater in any block of the district. The State department Agency which looks after the exploration and development of groundwater should set up piezometers in each block of the district and monitor the water level in these piezometers every month in order to keep a check on the limits of excessive withdrawal of groundwater in a particular block. General decline in the hydrographs of these piezometers would indicate that the area is facing excessive groundwater withdrawal and immediate steps are to be taken to stop any further withdrawal.

8.0 Awareness & Training Activity

So far Awareness and Training activity was not arranged by CGWB in this district.

9.0 Areas Notified by CGWA/SGWA

No area of Koch Bihar district has been notified by CGWA/SGWA.