

GROUND WATER INFORMATION BOOKLET
MURSHIDABAD DISTRICT, WEST BENGAL

DISTRICT AT A GLANCE

Sl. No.	Items	Statistics
1.	GENERAL INFORMATION	
	i) Geographical Area (Sq. km.)	5324
	ii) Administrative Division (as on 2001)	
	• No. of Subdivision	5 nos.
	• No. of Blocks	26 nos.
	• No. of Municipalities	7 nos.
	• No. of inhabited villages	2210 nos.
	iii) Population (as on 2001 Census) (with density of population)	58,66,569 (1102 per sq.km.)
	iv) Normal Annual Rainfall (mm)	1417
2.	GEOMORPHOLOGY	
	Major Physiographic Units	1. Lateritic Upland, 2. Older deltaic plain 3. Newer Deltaic Plain 4. Bhagirathi Terrace
	Major Drainages	River Ganga/ Padma, Bhairab, Jalangi, Darwaka and Mayurakshi etc.
3.	LAND USE (Sq.km.) (as on 2004-05)	
	a) Forest Area	7.71
	b) Net Area Sown	4045.70
4.	MAJOR SOIL TYPES	Red sandy and loamy soil, lateritic soil, older and younger alluvial soils.
5.	AREA UNDER PRINCIPAL CROPS (Sq.km.) (As on 2004-05)	Total Cereals: 5457.0 Total Pulses: 638.0 Total Oilseeds: 918.0 Total Fibre: 1318.0 Total Miscellaneous Crops: 210.0
6.	IRRIGATION BY DIFFERENT SOURCES (Areas & No. of Structures)	
	Tube wells	1705.56 sq. km. area irrigated through 83157 STW and 212.11 sq. km. area irrigated through 588 DTW
	Surface Flow	41.93 sq.km. area irrigated through 1808 nos. of Surface flow .
	Surface Lift (RLI)	144.71 sq. km. area irrigated through 1758 nos. of RLI.
	Actual area irrigated by GW	1917.67 sq.km
	Actual area irrigated by SW	186.64 sq.km
	Total Irrigated Area	2104.31 sq.km.
7.	NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.03.07)	74
	No. of Dug wells	29
	No. of Piezometers/ Tube wells	45
8.	PREDOMINANT GEOLOGICAL FORMATIONS	Recent and Older alluvium.
9.	HYDROGEOLOGY	
	➢ Major Water bearing formation	Quaternary alluvium

	> Pre-monsoon depth to water level during 2006	1.14 to 10.55mbgl in Dug wells and 4.30 to 19.90m bgl in piezometers.
	> Post-monsoon depth to water level during 2006	0.56 to 7.65mbgl in Dug wells and 0.35 to 14.02m bgl in piezometers
	> Long term water level trend in 10 years (1997-2006) in m/yr	Declining trend of water level to the tune of 0.01to 0.4 m/yr.and rising trend to the tune of 0.01to 0.18m/yr.
10.	GROUND WATER EXPLORATION BY CGWB (As on 31.03.07)	
	No. of wells drilled	44
	Depth Range (m)	Maximum depth drilled 350m bgl
	Discharge (lps)	1lps to 24 lps
	Storativity (S)	7.6×10^{-4} to 4.98×10^{-1}
	Transmissivity (m^2/day)	2500 to 8000 m^2/d
11.	GROUND WATER QUALITY	
	Presence of Chemical constituents more than permissible limit	Arsenic , Iron
	Type of water	Ca-Mg-HCO ₃
12.	DYNAMIC GROUNDWATER RESOURCES in mcm	
	Annual Replenishable GroundWater Resources	22.7033
	Gross Annual Ground water draft	20.0837
	a) For Irrigational use	19.1893
	b) For domestic & industrial use	0.8944
	Projected Demand for domestic and Industrial uses upto 20-25	1.8303
	Stage of Ground Water Development	88.46
13.	AWARENESS AND TRAINING ACTIVITY	
	Number of Mass Awareness programme organised	2
	Number of Water Management Training programme organised	1
14.	EFFORTS OF ARTIFICIAL RECHARGE AND RAIN WATER HARVESTING	
	Projects Completed by CGWB (No. and amount spent)	Nil
	Projects under technical guidance of CGWB (nos)	Nil
15.	GROUND WATER CONTROL AND REGULATION	
	No. of over-exploited blocks	Nil
	No. of Critical Blocks	1
	No. of Blocks notified	Nil
16.	MAJOR GROUND WATER PROBLEMS AND ISSUES	<ol style="list-style-type: none"> 1. Arsenic conc. in ground water beyond permissible limit 2. Iron conc. in ground water beyond permissible limit 3. Declining trend of water level specially in Critical & Semi-critical blocks

4.1 Geology The deposition in this district took place by Ajoy-Damodar-Mayurakshi river system constituting Older Alluvium of Pleistocene age occupies the western part of the district,i.e., the west of Bhagirathi river.The older alluvium is characterised by argilaceous sediment(clay and calareous material).Laterisation of the sediment is often observed at the surface clay.The clays are very stiff and plastic in nature. The area east of the Bhagirathi river is covered by Recent to subrecent alluvium having enormous thickness of the Ganga river system. the Quarternary sediment have been deposited in and around wide deltaic flood plain.The recent fluvialite sediments consist of succession of clay,silt,sand and gravel.sand size varies from fine to coarse. The colour is light grey.The sand are highly micaceous.gavels are subrounded to rounded in shape.

4.2 Hydrogeology : Groundwater occurs in a thick zone of saturation in the alluvium deposited by the river system.The sand and gravel horizons of different textures constitute main aquifers and occur down to 90-350m bgl in the eastern part and 150mbgl in the western part of the district.

Groundwater in the eastern part of the Bhagirathi river occurs generally under water table conditions. Impervious clay layers which act as confining beds are rather absent,but wherever is present it is sandy clay or silty clay forming partially confining conditions.

Groundwater in the western part of the Bhagirathi river occurs under both unconfined and confined conditions. In the confined condition, the aquifers are sometimes separated by lenticular clay beds at depths and are regionally connected resulting in artesian conditions. Flowing artesian conditions are found in shallow tube wells which are seasonal in nature.

Depth to water level in pre-monsoon period (2006) varies from 1.14 to 19.90 mbgl whereas that to post- monsoon is from 0.35 to14.02 mbgl.

Aquifer characteristics : Tubewells in the western part of the Bhagirathi river are constructed tapping both unconfined and confined aquifers and are capable to yield 150 m /hr with nominal drawdown of 4-5m. The yield of the shallow tubewells is about 30m /hr with a drawdown less than 4m.Transmissivity values ranges from 3000-7000 m /day and the storativity ranges from 1.16×10^{-4} to 4.98×10^{-4} .

4.3 Groundwater Resources:

The dynamic ground water resources of Murshidabad 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 31.03.04.

The reconciled figures are as under:

Total Ground Water Resources	:	252264 ham
Net Annual Ground Water Availability	:	227038 ham
Existing Ground Water Draft for All Uses:	:	200837 ham
For Irrigation	:	191893 ham
For domestic & industrial water supply	:	8944 ham
Stage of Ground Water Development	:	88.46 %
Allocation for domestic & industrial water supply requirement upto 25 yrs.	:	18303 ham
Net Ground Water Availability for future irrigation development:	16842 ham	
Categorization of blocks	:	10 no. of blocks are categorized under 'Safe', 15 blocks are under 'Semi-critical' & 1 under "Critical" category.

GROUND WATER INFORMATION BOOKLET MURSHIDABAD DISTRICT, WEST BENGAL

1.0 INTRODUCTION

Administrative details

- Location and area : The district is bounded by the latitude $24^{\circ}50'20''$ N to $23^{\circ}43'30''$ N and longitudes $88^{\circ}46'00''$ E to $87^{\circ}49'17''$ E. The total geographical area of the district is 5324 Sq. Km. It has 5 subdivisions consisting of 26 blocks, 26 Panchayat samitis. The total police station is 26. There are 255 Gram Panchayats with 2210 villages. **Baharampur** is the headquarter of this district.
- Ground water basin : The district is located in the lower part of the Ganga basin.
- Drainage : The Ganga/or The Padma with tributaries/distributaries namely the Bhagirathi, the Jalangi, the Bhairav, the Dwaraka & the Mayurakhi form the main drainage.
- Irrigation practices : The cultivation is done mainly by groundwater alongwith the surface water from canals, tanks and river.
- Studies of C.G.W.B : CGWB has completed systematic Hydrogeological survey and continuing Groundwater Management Studies. Apart from this, Groundwater Exploration is being carried out to delineate the aquifer geometry and to know the aquifer characteristics. Special attention has been given to identify the deeper aquifers and construction of tube wells adopting cement sealing techniques in arsenic infested areas to provide arsenic free water through state agencies. Arsenic free water yielding tube wells have been constructed in seven arsenic affected blocks. Depth range of the aquifer tapped is between 80mbgl and 254mbgl.

2.0 Rainfall & Climate

- Rainfall : The normal rainfall is of the tune of 1417mm.
- Climate : The district is characterised by hot and humid climate. It receives adequate rainfall from South-West monsoon, which sets in the later half of June and withdraws by the middle of October. Premonsoon rains are received during March-April. Max. and Min. temp. as recorded are 43°C and 08°C .

3.0 Geomorphology & Soil Types

- Geomorphology : The district is divided into four (4) geographic units :
1. Lateritic upland
 2. Older deltaic plain
 3. Younger deltaic plain
 4. Bhagirathi Terrace
- Soil Types : Depending upon the soil types, the district is divided in two separated zones
- a) Rarh which is found in the western side of the Bhagirathi river is substantially a continuation of the sub-Vindhyan region of lateritic clay and calcareous nodules.
 - b) Bagri which is found in the eastern side of the Bhagirathi river composed of light alluvial fertile soil.

4.0 Groundwater Scenario

4.4 Groundwater Quality

The chemical quality of groundwater in the area in general of Ca-Mg-HCO type. The chloride content in groundwater is low (18-96mg/l). The water is mainly neutral to mildly alkaline in nature and pH value ranges between 7.6 and 8.2. Total hardness as CaCO_3 ranges from 150-410 mg/l. Generally iron content ranges from 0.1-0.55 mg/l. but in few places it is found even of the order of 11.0 mg/ Raninagar-II block).

Thus, the chemical quality of groundwater in both shallow and deeper aquifers is good except in 19 blocks where sporadic occurrence of arsenic contamination in groundwater has been noticed in shallow aquifer which is not safe for domestic purposes.

4.5 Status of Groundwater Development (Blockwise):

Status of Groundwater Development (Blockwise):

Block	Occurrence of Aquifers & its potentiality (as per data available with CGWB)	Feasibility of GW Abstraction Structures	Ground Water Resource Available, Irrigational draft Stage of GW development(SOD) & existing Structures (as on March'04)	Remarks
1.Bharatpur I	Multiple aquifer system occurs, in general, in the depth span of 4.00-86.06 and 100-184 mbgl, T of the aquifers is about 2900 m ² /d and S is about 6.00x10 ⁻⁴ .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 6971.53 ham Irrigation has been done through 1498 nos of STW & 8 no of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 2932.31 ham. SOD is 45.84%	SemiCritical block, WL declining Withdrawal is restricted
2. Raghunathganj I	in general, in the depth span of 4.00-86.06 and 100-184 mbgl, T of the aquifers is about 4676 m ² /d and S is about 1.50x10 ⁻³ .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible	Net GW Availability is 3782.82 ham Irrigation has been done through 767 nos of STW & 4 no of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 1753.68 ham. SOD is 52.73%	Safe category Arsenic affected in down to depth of 80mbgl
3. Sagardighi	in general, in the depth span of 4.00-86.06 and 100-184 mbgl, T of the aquifers is about 4000 m ² /d and S is about 2.2x10 ⁻³ .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible	Net GW Availability is 12325.33 ham Irrigation has been done through 2390 nos of STW & 22 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 5638.35 ham. SOD is 49.03%	SemiCritical block, WL declining Withdrawal is restricted
4. Suti I	in general, in the depth span of 4.00-86.06 and 100-184 mbgl, T of the aquifers is about 2000 -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 is 4075.09ham Irrigation has been done through 1290 nos of STW, 3 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 2866.27 ham. SOD is 75.89%	Safe category Arsenic affected in down to depth of 80mbgl
5. Suti II	in general, in the depth span of 4.00-86.06 and 100-184 mbgl, T of the aquifers is about 2000 -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 is 3290.03 ham Irrigation has been done through 1481 nos of STW, 9 nos of DTW has been projected upto 2004 as 3414.68 ham. SOD is 113.53%	SemiCritical block, Arsenic affected in down to depth of 80mbgl Withdrawal is restricted
6. Barwan	in general, in the depth span of 4.00-86.06 and 100-184 mbgl, T of the aquifers is about 2900m ² /d and S is about 6.0x10 ⁻⁴ .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 12218.02 ham Irrigation has been done through 2919 nos of STW, 9 nos of DTW has been projected upto 2004 as 6515.59 ham. SOD is 56.6%	Semi Critical block, WL declining Withdrawal is restricted
7. Beldanga I	In general, in the depth span of 4.00-80.06 100-150 mbgl, and 180-240m bgl T of the aquifers is about 2495 m ² /d and S is about 2.50x10 ⁻³ .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 8269.18 ham Irrigation has been done through 2980 nos of STW, 5 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 6594.02 ham. SOD is 84.9%	Safe category Arsenic affected in down to depth of 80mbgl
8. Beldanga II	In general, in the depth span of 4.00-80.06 100-150 mbgl, and 180-240m bgl.T of the aquifers is about 2495 m ² /d and S is about 2.2x10 ⁻³ .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 9559.76 ham Irrigation has been done through 3317 nos of STW, 9 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 7385.76 ham. SOD is 81.01%	Safe category Arsenic affected in down to depth of 80mbgl

9. Berhampur	Multiple aquifer system occurs, in general, in the depth span of 4.57-86.06 and 100-184 mbgl, T of the aquifers is about 7000 m ² /d and S is about 2.24×10^{-3}	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 11594.17 ham Irrigation has been done through 5169 nos of STW & 69 no of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 12683.09 ham. SOD is 114.63%	SemiCritical block, WL declining Arsenic affected in down to depth of 80mbgl Withdrawal is restricted
10. Bhagabangola I	in general, in the depth span of 4.00-80.06 and 100-220 mbgl, T of the aquifers is about 8655 m ² /d and S is about 1.16×10^{-4} .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 8012.73 ham Irrigation has been done through 3405 nos of STW, 21 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 7790.32 ham. SOD is 100.57%	SemiCritical block, WL declining Arsenic affected in down to depth of 80mbgl Withdrawal is restricted
11. Bhagabangola II	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 8655 m ² /d and S is about 1.16×10^{-4} .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 7850.56 ham Irrigation has been done through 3835 nos of STW, 18 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 8715.05 ham. SOD is 113.86%	SemiCritical block, Arsenic affected in down to depth of 80mbgl withdrawal is restricted
12. Bharatpur II	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 2900 m ² /d and S is about 6×10^{-4} .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 4782.66 ham Irrigation has been done through 1273 nos of STW, 16 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 3113.03 ham. SOD is 70.5%	Critical block Water Level declining during both pre & post monsoon period withdrawal is restricted
13. Domkal	in general, in the depth span of 4.00-55.00 and 91-200 mbgl, T of the aquifers is about 4059m 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 is 18077.64 ham Irrigation has been done through 10971 nos of STW, 62 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 25132.38 ham. SOD is 141.87%	SemiCritical block, Arsenic affected in down to depth of 80mbgl Withdrawal is restricted
14. Farakka	in general, in the depth span of 5.00-76.00 and 91-103 mbgl, T of the aquifers is about 1200 m ² /d.	Low duty (30-40 m ³ /hr. tube wells are generally feasible	Net GW Availability is 4875.4 ham Irrigation has been done through 257 nos of STW, (as per Census 2001) & the irrigation draft has been projected upto 2004 as 542.5 ham. SOD is 18.5%	Safe category Arsenic affected in down to depth of 80mbgl
15. Hariharpara	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 8366m ² /d and S is about 1.28×10^{-3} .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 13258.63 ham Irrigation has been done through 6229 nos of STW, 36 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 14261.89 ham. SOD is 110.41%	SemiCritical block, Arsenic affected in down to depth of 80mbgl Withdrawal is restricted
16. Jalangi	in general, in the depth span of 4.00-55.00, 78-122 and 190-254 mbgl down to the explored depth of 345m bgl, T of the aquifers is about 5142m ² /d and S is about 4.21×10^{-3} .	Low duty (30-40 m ³ /hr), and Heavy duty (100 - 150 m ³ /hr) tube wells are generally feasible.	Net GW Availability is 7244.93 ham Irrigation has been done through 4298 nos of STW, 51 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 10378.23 ham. SOD is 148.1%	SemiCritical block, Arsenic affected in down to depth of 80mbgl Withdrawal is restricted

18. Khargram	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 1200 -2000 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 is 15313.84 ham Irrigation has been done through 1761 nos of STW, 2 nos of DTW I (as per Census 2001) & the irrigation draft has been projected upto 2004 as 3844.31 ham. SOD is 27.79%	Safe category
19. Lalgola	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 1200 -2000 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 is 7968.18 ham Irrigation has been done through 4867 nos of STW, 46 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 11162.83 ham. SOD is 145.36%	SemiCritical block, Arsenic affected in down to depth of 80mbgl
20. Mur- Jiaganj	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 1200 -2000 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 is 11306.47 ham Irrigation has been done through 5243 nos of STW, 35 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 1210.8 ham. SOD is 109.96%	SemiCritical block, Arsenic affected in down to depth of 80mbgl
21. Nabagram	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 1200 -2000 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 is 8545.62ham Irrigation has been done through 2485 nos of STW, 47 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 6350.71 ham. SOD is 78.12%	SemiCritical block, WL declining
22. Nawda	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 1200 -2000 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 is 12123.59 ham Irrigation has been done through 6018 nos of STW, 28 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 13128.53 ham. SOD is 111.05%	SemiCritical block, Arsenic affected in down to depth of 80mbgl
23. Raghunath Gang II	in general, in the depth span of 4.00-86.06 and 100-184 mbgl, T of the aquifers is about 1200 -2000 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 is 4415.8 ham Irrigation has been done through 852 nos of STW, (as per Census 2001) & the irrigation draft has been projected upto 2004 as 1822.8 ham. SOD is 48.41%	Safe category Arsenic affected in down to depth of 80mbgl
24. Raninagar I	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 1200 -2000 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 is 9700.79 ham Irrigation has been done through 5164 nos of STW, 28 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 11024.99 ham. SOD is 116.3%	SemiCritical block, Arsenic affected in down to depth of 80mbgl
25. Raninagar II	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 1200 -2000 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 is 9352.89 ham Irrigation has been done through 3549 nos of STW,32 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 7914.27 ham. SOD is 87.5%	Safe category Arsenic affected in down to depth of 80mbgl
26. Samsarganj	in general, in the depth span of 4.00-76.00 and 100-200 mbgl, T of the aquifers is about 1200 -2000 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 is 3514.48 ham Irrigation has been done through 528 nos of STW, 7 nos of DTW (as per Census 2001) & the irrigation draft has been projected upto 2004 as 1297.67 ham. SOD is 47.34%	Safe category Arsenic affected in down to depth of 80mbgl

5.0 Groundwater Management Strategy

5.1 Groundwater Development :

At present groundwater development in this district is mainly controlled by the shallow tube wells along with some deep tube wells which are very less in number. As per the Groundwater Estimation Committee, 1997, the total groundwater resources thus calculated is about 227038 mham. About 200837mham is being withdrawn from different purposes which is about 88.45%. Thus further development may be restricted particularly in the semicritical blocks (Nabagram, Sagardighi, Suti-II, Baharampur, Bhagabangola-1&II, Domkal, Hariharpara, Jalangi, Lalgola, Mur-Jiaganj, Noada, Raninagar-1, Barowan, Bharatpur-I.) as well as in the only critical block (Bharatpur-II). Rest of the blocks are in safe category i.e. Raghunathganj, Suti-1, Beldanga-II, Farakka, Kandi, Khargram, Raghunathganj, Raninagar-II and Samserganj.

Estimation of groundwater has been calculated based on the data of shallow tube wells tapping the unconfined aquifers only. But there are sufficient 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 aquifers may be taken up by constructing deep tube wells applying cement sealing techniques in the arsenic affected blocks of the districts .

5.2 Water Conservation & Artificial Recharge :

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

6.0 Groundwater related issues and problems

1. Groundwater quality problem (Geogenic) : Arsenic in groundwater in sporadic manner has been identified in 19 blocks. A total population of 4008480 are residing in risk zone. Arsenic concentration in groundwater varies from 0.001-1.85mg/l. Ground water exploration of CGWB reveals that in arsenic affected area, arsenic free deep aquifers are available which are capable of yielding arsenic free water. So far CGWB has constructed 24 deep tubewells in 7 blocks which are handed over to state agencies to supply water. Apart from this, the state govt. as well as other organizations/ agencies has installed arsenic removal plants & domestic filters which are producing arsenic free water. In some part of the district, surface water is being provided by the State Govt. to the arsenic affected people.
2. Water Logged Areas : Water logging problems have been observed in parts of Farakka, Suti and Raghunathganj blocks.
3. Areas having decline in water level: From the long term monitoring of water level, declining trend has been observed in some parts of district specially in Bharatpur II block.
4. Drilling problem : In some area, it is observed that deep aquifers are not found within 350m bgl particularly in the southern part of the district where high capacity of drilling rig is required to explore beyond 350mbgl.
4. Risk to Natural disasters : a) Natural erosion along the banks of the Ganga river causing huge loss of agricultural & residential land specially in rainy season is a serious problem in the blocks along the river banks.

7.0 Awareness & Training Activity

7.1 Mass Awareness Program (MAP) :

A total two no. of mass awareness programme was conducted in this district the details are given below :

Sl.No	Place/ Block	Participants	Theme
1.	Raninagar /Raninagar I	200	Arsenic Menace in ground water of Murshidabad district-Measures for its mitigation
2.	Bharatpur/ Bharatpur II	250	Ground Water Management and Rain Water Harvesting

7.2 Ground Water Management Training Programme (WMTP) :

One Ground Water Management Training Programme was conducted in this district. The detail is given below :,

Sl.No	Place/ Block	Participants	Theme
1.	Kandi/ Kandi	17	Ground Water Development and Management with special reference to Rain Water Harvesting

7.3. Exhibition/ Mela/ Fair etc :

Sl.No	Place/ Block	Organiser	objective
1.	Jangipur/ Raghunathganj	All India Agriculture, Science and Industrial Expo-2002	Displayed various models , charts, maps prepared by CGWB to aware the common people on ground water issues

7.4. Presentation and lectures delivered: Delivered lectures by CGWB officers :

Sl.No	Place/ Block	Participants	Organiser	Theme
1.	Kandi/ Kandi	Panchayat, Block level SAE's	Zilla Parisad Murshidabad under NREG scheme	Rain Water Harvesting through excavation of ponds, tanks etc. for assured 100 days employment.

8.0 Area Notified by CGWB/ SGWA

List of area : Nil

9.0 Recommendations

- At present district has ground water resources of 227038 mham, of which gross ground water draft is 200837 mham which it self indicates that present stage of GW development is nearly 88.46%. Therefore, it is essential to take cautious approach for further ground water development of the district as a whole.
- Out of 26 blocks of the district, 10 blocks are under Safe Category (Raghunatganj, Suti I, Beldanga I&II, Farakka, Kandi, Khigram, Raghunathganj II, Ranninagar II & Samserganj) where further ground water development can be done through construction of Shallow tubewell and deep tubewells; 15 blocks under Semi-critical (Nabagram, sagardighi, Suti II, Berhampur, Bhagabangola I&II, Domkal, Hariharpura, Jalangi, Lalgola, Murjiagang, Naoda, Raninagar I, Burwan and Bharatpur I) where further ground water development can be done cautiously with close monitoring of water level through construction of Shallow

tubewells and deep tubewells and 1 block under Critical category (Bharatpur II) where further ground water development can be restricted.

3. In arsenic infested blocks ground water used for drinking purposes should be from arsenic free deeper aquifers and tubewells should be properly designed adopting cement sealing techniques. Ground water from contaminated aquifer may be used after properly treated through arsenic removal units and same may be periodically monitored.
4. Rainwater harvesting techniques may be adopted for artificial recharge specially in critical/ Semi critical blocks where water level is declining. In this regards Roof top rain water harvesting techniques can be followed for water conservation and in places for artificial recharge.
5. In water logged areas (in parts of Farakka, Suti I and Raghunathganj blocks) stresses have to be given on ground water development rather than surface water. In this respect proper drainage to drain out the excess surface water to the adjacent blocks where the problem of water logging does not persist.
6. Cropping Pattern can be changed and crops with low water requirement can be adopted in Critical & Semicritical blocks.
7. Modern irrigation practice should be adopted to minimize the use of ground water specially in Critical & Semicritical blocks.

ARSENIC IN GROUND WATER AND ITS REMEDIAL MEASURES

Arsenic contamination in ground water in sporadic manner has been reported in 19 blocks of Murshidabad district. The affected blocks are Raninagar I&II, Domkal, Nowda, Jalangi, Hariharpara, Suti I&II, Bhagwangola I&II, Beldanga I&II, Berhampur, Raghunathganj I&II, Farakka, Lalgola, Mur-Jiagang and Samserganj. A total population of 4008480 in 1218 habitations are at risk zone. The concentration of arsenic in ground water varies from 0.001-1.85 ppm.

Considering the gravity of the situation, Govt Of West Bengal constituted a working group comprising of eminent experts in the related field from both the State and Central Govt organizations as well as from academic institutions to examine and investigate into the matter. Several programme has been taken up by the committee (Arsenic Task Force) to overcome this meanace.

Remedial Measures :

A) Use of ground water from arsenic free aquifer:

The arsenic contamination in ground water above permissible limit (0.01ppm) is in general confined to the aquifers down to the depth of 80 mbgl. The aquifers below 80 mbgl are in general arsenic free and are separated from the upper contaminated aquifer/s by thick impervious clay beds. These deep aquifers have been identified and screened accordingly for construction of heavy duty tubewells adopting proper cement sealing techniques to prevent vertical percolation from the upper contaminated aquifers. So far CGWB has constructed 24 nos tubewells in 7 blocks which have already handed over to the State agencies free of cost for supplying arsenic free drinking water in some of the affected habitations.

B) Use of surface water :

Surface water from perennial rivers / tanks are being used for drinking water purpose through pipe water supply schemes after proper treatment by state Govt.

C) Use of Arsenic Treatment Unit :

In order to remove excess arsenic from ground water, the following technologies have been adopted :

- a. Coagulation, Flocculation, Sedimentation and filtration
- b. Excess lime treatment
- c. Adsorption through activated granular carbon or activated alumina
- d. Ion Exchange
- e. Reverse Osmosis

Using all the above technologies, different types of Arsenic Treatment Units (ATU) have been installed by Govt Organizations and private organizations which are being used satisfactorily for supplying arsenic free ground water in some arsenic affected localities.