GROUND WATER INFORMATION BOOKLET
HAORA DISTRICT, WEST BENGL

DISTRICT AT A GLANCE

Sl. No	ITEMS	STATISTICS	
1.	**GENRAL INFORMATION**		
	i) Geographical Area (Sq.km.)	1467	
	ii)Administrative Division (as on 2001)		
	• No. of Subdivision	02	
	• No. of Blocks	14	
	• No. of Municipalities	02	
	• No. of panchayat	157	
	• No. of inhabited villages	727	
	iii) Population (as on 2001Census)	4273099	
	iv) Normal Annual Rainfall (mm)	1536	
2.	**GEOMORPHOLOGY**		
	Major Physiographic Units	Alluvial plain	
	Major Drainages	Hugli, Damodar, Rupnarayan river	
3.	**LAND USE (Sq.km.) (as on 2004-05)**		
	a) Forest Area	NIL	
	b) Net Area Sown	777.07	
4.	**MAJOR SOIL TYPES**	Silty clay and sandy loam	
5	**AREA UNDER PRINCIPAL CROPS (Sq.km.)(Ason 2004-05)**	Total cereals Total pulses Total food grain Total oil seeds Total fiber Total miscellaneous crops	1335.00 0.2 133.7 54.00 62.00 65.00

6.	**IRRIGATION BY DIFFERENT SOURCES (Areas & No. of Structures)**	Area (Sq.Km.)	No. of structure	
		Based on Third minor irrigation report (2000-2001)		
	Shallow Tube wells	353073	1116	
	Deep Tube wells	512686	183	
	Surface flow	3369121	474	
	Surface Lift Irrigation	4134000	9381	
	Actual area irrigated by Ground water scheme	865759		
	Actual area irrigated by Surface water scheme	7503121		
	Total actual area irrigated	83688.80		
7.	**NUMBERS OF GROUND WATER MONITORING WELLS OF CGWB (As on 31.03.07)**			
	No.of Dug wells	6		
	No. of Piezometers/Tube wells	9		
8.	**PREDOMINANT GEOLOGICAL FORMATIONS**	Recent alluvium		
9.	**HYDROGEOLOGY**			
	➢ Major Water bearing formation	Quaternary alluvium		
	➢ Pre-monsoon depth of water level during 2006(mbgl)	Dug well	1.06 - 4.06	
		TW / PZ	5.29 -11.13	
	➢ Post-monsoon depth of water level during 2006(mbgl)	Dug well	1.02 - 2.2	
		TW / PZ	5.01 - 9.99	
	➢ Long term water level trend in 10 years (1997-2006) in m/yr		Dug well	TW / PZ
		Rising	0.11 – 0.06	0.28 - 0.81
		Falling	0.04 - 0.17	-
10.	**GROUND WATER EXPLORATION BY CGWB (As on 31.03.07)**			
	No. of wells drilled (EW)	6		
	Depth Range (m)	147 – 609.9		
	Discharge (lps)	10 – 58.65		
	Storativity (S)	45×10^{-4}		
	Transmissivity (m^2/day)	446 – 2514.8		
11.	**GROUND WATER QUALITY**			
	Presence of Chemical constituents more than permissible limit	Salinity, Iron, Arsenic		
	Type of water	$Na\text{-}HCO_3$		

12.	**DYNAMIC GROUNDWATER RESOURCES in mcm**	
	Annual Replenishable Ground Water Resorces	33330
	Gross Annual Ground water draft	6870
	a) For irrigational use b) For domestic & industrial use	5096 1174
	Projected Demand for domestic and Industrial uses upto 2025	2421
	Stage of Ground Water Development	20.61%
13.	**AWERENESS AND TRAINING ACTIVITY**	
	Number of Mass Awareness program organized	1
	Number of Water Management Training program organised	1
14.	**EFFORTS OF ARTIFICIAL RECHARGE AND RAIN WATER HARVESTING**	
	Projects Completed by CGWB (No. and amount spent)	-
	Projects under technical guidance of CGQB (nos)	-
15.	**GROUND WATER CONTROL AND GEGULATION**	
	No. of over-exploited blocks	-
	No. of Critical Blocks	-
	No. of Blocks notified	-
16.	**MAJOR GROUND WATER PROBLEMS AND ISSUES**	Salinity, Iron, Arsenic

4.0 Groundwater Scenario

4.1 Geology :

Haora district is underlain by unconsolidated Quaternary alluvium laid down by the South flowing Bhgirathi-Hugli river System. The alluvial sediments in the form of flood Plain deposits consist of the sands of various grades, silt and clay with occasional gravel beds. The sands are fine to coarse grained and sub-rounded. Immediately below the land surface a thick layer of sticky clay ranging in thickness between 30-70 m and often broken either by sand lenses or silt is encountered. Exploratory drilling carried out in parts of the district has reveled the presence of clay bed even around a depth of 300 m bgl. Which continues even beyond a depth of 548 m bgl. Apart from persistence of clay beds at deeper levels, the exploration has also brought to light occurrence of potential and fresh aquifer zones of considerable thickness down to a depth of 300 m bgl.

4.2 Hydrogeology :

Ground water in Haora district, occurs under both water table and confined to semi-confined conditions in aquifer which starts from 4.236 m bgl. The shallow aquifer are tapped by dug wells, while the deeper aquifers are tapped by medium to heavy duty tubewells. Dug wells in the district generally vary in depth from 5-15 m bgl. The majority of them being restricted to 10 m depth. Some open wells tend to dry up in summer as they are restricted either to the silty cay zone or tapped very little upper part of the aquifer zones. The northern parts of the district comprising the blocks of Udynaraynpur, Amta I & II, Jagatballabhpur and Domjur Blocks are characterized by water table aquifers. The fresh ground water bearing aquifers occur between 150-300 m bgl in the above 9 blocks.

4.3 Groundwater Resources

The dynamic ground water resources assessment has been done jointly by CGWB and SWID, Govt. of W.B. following the norms laid down by GEC 1997 methodology and projected as on 31.03.04, only in 5 blocks, which are unconfined in nature. The nine semi-confined to confined blocks lie in coastal plain of West Bengal. The upper aquifers of above nine blocks, down to 150 m bgl are brackish in nature and fresh Ground water bearing aquifers occur between 150-300 m bgl. In Haora district all the 5 blocks(confined) are under safe category. The summarized Ground water resources in the district (Block wise) are as under-

Assessment Unit/ District	Command/ non-command/ Total	Net Ground water availability (in ha m)	Existing gross Ground water draft for irrigation (in ha m)	Existing gross Ground water draft for domestic and industrial water supply (in ha m)	Existing gross Ground water draft for all use (in ha m)	Association for domestic and industrial requirement supply upto next 25 years (in ha m)	Net Ground water availability for future irrigation development. (in ha m)	Stage of Ground water Development. (%)
Amta I	NC	1864	0					
	C	5093	714					
	T	**6957**	**714**	336	1049	458	5786	15.08
Amta II		7236	523	320	842	436	6278	11.64
Domjur		5031	120	467	588	638	4272	11.68
Udaynarayanpur		6423	2702	289	2991	395	3326	46.57
Jagatballavpur	NC	1267	0					
	C	6416	1037					
	T	**7683**	**1037**	362	1399	494	6152	18.21
Total		**33330**	**5096**	**1774**	**6870**	**2421**	**25814**	**20.61**

4.4 Groundwater Quality

Ground water in Haora district, both from Shallow aquifers and deeper aquifers, is fresh and good for both domestic and agricultural purposes, except in the blocks of Bally-Jagacha, Uluberia I & II, Sankrail, Bagnan I & II, Shyampur I & II and Panchla. In these blocks, the aquifers down to about 150 m bgl contains brackish water below which fresh water is encountered which is presently being tapped for domestic and agricultural purposes. Ground water throughout the district is slightly alkaline (both dugwell and tubewell) the pH varying from 7.90 – 8.40. Ground water both from shallow and deeper aquifers are of sodium bicarbonate type. It is generally observed that the quality of Ground water occurring between 150 and 300 m bgl is comparatively better than the ground water tapped within 150 m bgl.

Arsenic occurs in Ground water in Uluberia-II and Shyampur-II blocks. Arsenic in groundwater is generally confined to the depth of 50 meter below ground level. Arsenic concentration in Ground water ranges between 0.05 – 0.35mg/1. In majority of the cases the Arsenic varies between 0.01 to 0.05 mg/1 and only in a few cases it has exceeded the permissible limit of 0.05 mg/1. Ground water in the district is suitable for domestic use, except for a few localized pockets of contamination. Ground water in the district is also suitable for irrigation purposes.

4.5 Status of Ground water Development (Blockwise)

Block	Occurrence of Aquifers & its potentiality	Feasibility of GW abstraction structures	Existing Structures		Remarks
			Third minor irrigation report (2000-2001)	District Statistical handbook-2005	
Bally-Jagacha	In the depth span of 18 – 55 mbl. T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d		Irrigation has been done through Surface water		The aquifers down to about 160 m bgl contains brackish water . The fresh ground water bearing aquifers occur between 150-300mbgl.
Panchla	In the depth span 140 – 150, 165-195, 200- 230 mbgl T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d	STW - 22.7-32.0 m^3/hr DTW – 160-216 m^3/hr with drawdown 1.83-7.14 m	Irrigation has been done through 05 no of DTW	Irrigation has been done through 01 no of STW & 04 no of DTW	The aquifers down to about 160 m bgl contains brackish water. The fresh ground water bearing aquifers occur between 150-300mbgl.
Sankrail	In the depth span 94 – 139, 148.44-244.75 mbgl T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d	STW - 22.7-32.0 m^3/hr DTW – 160-280 m^3/hr	Irrigation has been done through Surface water	Irrigation has been done through 04 no of STW	The aquifers down to about 160 m bgl contains brackish water. The fresh ground water bearing aquifers occur between 150-300mbgl.
Uluberia I	In the depth span 140 – 150, 165-195, 200- 230 mbgl T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d	DTW – 160-280 m^3/hr	Irrigation has been done through 01 no of DTW	Irrigation has been done through 02 no of DTW	The aquifers down to about 160 m bgl contains brackish water. The fresh ground water bearing aquifers occur between 150-300mbgl.
Uluberia II	In the depth span 140 – 150, 165-195, 200- 230 mbgl T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d	DTW – 160-216 m^3/hr with drawdown 1.83-7.22 m	Irrigation has been done through Surface water (for 2004-05)		Arsenic affected down to the depth of 50 mbgl. The fresh ground water bearing aquifers occur between 150-300mbgl. The aquifers down to about 160 m bgl contains brackish water

Block	Occurrence of Aquifers & its potentiality	Feasibility of GW abstraction structures	Existing Structures		Remarks
			Third minor irrigation report (2000-2001)	District Statistical handbook	
Bagnan I	In the depth span 30 -50, 75 - 120 mbgl T of the aquifer 2514m^2/d and S is 45 x 10^{-4}	DTW – 169-222 m3/hr with drawdown 1.83-6.75 m	Irrigation has been done through 15 no of DTW	Irrigation has been done through 15 no of DTW	The aquifers down to about 160 m bgl contains brackish water The fresh ground water bearing aquifers occur between 150-300mbgl.
Bagnan II	In the depth span 30 -50, 75 - 120 mbgl T of the aquifer varies from 446 – 1872 m2/d and hydraulic conductivity varies between 18 and 75 m/d	DTW – 160-216 m3/hr with drawdown 4.70-7.14 m	Irrigation has been done through 12 no of STW & 21 no of DTW	Irrigation has been done through 10 no of DTW	The aquifers down to about 160 m bgl contains brackish water The fresh ground water bearing aquifers occur between 150-300mbgl.
Shyampur I	In the depth span 200 – 250, 275 - 285 mbgl T of the aquifer varies from 446 – 1872 m2/d and hydraulic conductivity varies between 18 and 75 m/d		Irrigation has been done through Surface water		The aquifers down to about 160 m bgl contains brackish water The fresh ground water bearing aquifers occur between 150-300mbgl.
Shyampur II	In the depth span 200 – 250, 275 – 285 mbgl T of the aquifer varies from 446 – 1872 m2/d and hydraulic conductivity varies between 18 and 75 m/d		Irrigation has been done through Surface water		Arsenic affected down to the depth of 50 mbgl. The aquifers down to about 160 m bgl contains brackish water. The fresh ground water bearing aquifers occur between 150-300mbgl.

Block	Occurrence of Aquifers & its potentiality	Feasibility of GW abstraction structures	Existing Structures		Remarks
			Third minor irrigation report (2000-2001)	District Statistical handbook	
Domjur	In the depth span 18 – 55 mbgl T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d	STW - 22.7-32.0 m^3/hr DTW – 160-280 m^3/hr	Irrigation has been done through 4 nos of STW and 5 no of DTW	Irrigation has been done through 4 no of DTW	Safe category The fresh ground water bearing aquifers occur between 31-236 mbgl.
Jagatballavpur	In the depth span14 – 17, 19 – 30, 75- 131 mbgl T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d	STW - 22.7-32.0 m^3/hr DTW – 169-286 m^3/hr with drawdown 1.83-10.60 m	Irrigation has been done through 158 nos of STW and 34 no of DTW	Irrigation has been done through 24 no of DTW	Safe category The fresh ground water bearing aquifers occur between 31-236 mbgl.
Amta I	In the depth span 19 – 30, 75- 131 mbgl T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d	STW - 22.7-32.0 m^3/hr DTW – 196-223 m^3/hr with drawdown 5.79-7.62 m	Irrigation has been done through 73 nos of STW and 26 no of DTW	Irrigation has been done through 42 no of STW & 20 no of DTW	Safe category The fresh ground water bearing aquifers occur between 31-236 mbgl.
Amta II	In the depth span 19 – 30, 75- 131 mbgl T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d	STW - 22.7-32.0 m^3/hr DTW – 160-226 m^3/hr with drawdown 4.72- 6.70 m	Irrigation has been done through 54 nos of STW and 19 no of DTW	Irrigation has been done through 180 no of STW & 18 no of DTW	Safe category The fresh ground water bearing aquifers occur between 31-236 mbgl.
Udaynarayanpur	In the depth span 19 – 30, 75- 131 mbgl T of the aquifer varies from 446 – 1872 m^2/d and hydraulic conductivity varies between 18 and 75 m/d	STW - 22.7-32.0 m^3/hr DTW – 169-217 m^3/hr with drawdown 4.57-8.53 m	Irrigation has been done through 815 nos of STW and 59 no of DTW	Irrigation has been done through 555 no of STW & 33 no of DTW	Safe category The fresh ground water bearing aquifers occur between 31-236 mbgl.

5.0 Groundwater Management Strategy

5.1 Ground water Development

At present ground water development in the district is very less with shallow tubewells as well as deep tubewells also. As per the Groundwater Estimation Committee, 1997 the total groundwater resources thus calculated is about 33330 mham. About 6870 mham is being withdrawn for different purposes which is about 20.61%.

Estimation of groundwater has been calculated based on the data of shallow tube wells tapping the unconfined aquifers only. But there are 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 the district. Rain water harvesting in the deeper confined aquifers may be taken in, Domjur, Amta I & II, Udaynarayanpur and Jagatballabhpur block, through recharge well.

6.0 Ground water related issues & problems

4.1 Salinity Ingress- Tidal influence of the lower reaches of the three major rivers in the district.

4.2 Water level decline –

Pre & Post monsoon decadal trend of water level in general shows rise in water level except few blocks i.e. Domjur, Amta I & II, Udaynarayanpur and Jagatballabhpur .

4.3 Ground water quality problems(geogenic)

Arsenic concentration in Uluberia-II and Shyampur-II blocks in Ground water ranges between 0.05 – 0.35mg/1. In majority of the cases the Arsenic varies between 0.01 to 0.05 mg/1 and only in a few cases it has exceeded the permissible limit of 0.05 mg/1.

7.0 Awareness & Training Activity

Mass Awareness Programme

Sl.No.	Place/Block	Participants	Theme
1	Bally Jagacha, Haora	95	Rain water harvesting

Training Activity

Sl.No.	Place/Block	Participants	Theme
1	Haora Town Hall	20	Ground Water Development and Management with special reference to Rain water harvesting

8.0 Areas notified by CGWA/SGWA

No area has been identified.

9.0 Recommendations

1. A close monitoring of the groundwater draft for irrigation from each block from medium and heavy duty irrigation tubewells is to be maintained to observe the status of draft taking place.
2. Ground water development in 9 coastal block needs specially designed tubewells considering the quantum of sub-surface outflow through the deeper aquifer. Overexploitation of groundwater through deeper fresh aquifers will create inequilibirium condition with the overlying and underlying saline aquifer, which may lead to saline water contamination to the fresh water bearing aquifer. Hence to monitor the behavior of the ground water regime, presently one heavy deep tube well(Beyond 170 mbgl) for each block is suggested in the coastal area of the district.
3. A good and effective cement sealing, in clay layer lying between fresh and brackish aquifer, is necessary in order to prevent any contamination of the fresh water aquifers by overlying brackish water aquifers.
4. A good and effective cement sealing, in clay layer lying between fresh and arsenic affected aquifer, is necessary in order to prevent any contamination of the fresh water aquifers by overlying arsenic affected water aquifers.
5. In arsenic infested blocks ground water used for drinking purposes should be 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.
6. The cropping pattern needs to be changed. Salt resistant crops may be introduced in the coastal blocks using brackish water from shallow aquifer for irrigation. Boro cultivation is to be discouraged as it requires large quantum of fresh ground water and instead high yielding varied with low water consumption is to be introduced.
7. Brackish water from shallow aquifer may be utilized after blending with fresh water. The blended water may be utilized for prawn cultivation.
8. Rainwater harvesting should be adopted particularly in coastal areas of the district. The existing ponds, bills should be renovated so that more rainwater could be stored. More new ponds may be excavated for conservation of rain water for irrigation purposes.
9. In Domjur, Amta I & II, Udaynarayanpur and Jagatballabhpur block artificial recharge to ground water should be adopted particularly where ground water level has been lowered due to more withdrawal of ground water.
10. Roof top rainwater harvesting may be encouraged particularly in coastal areas. The rain water from the roof is to be collected and stored in reservoirs (may be cemented or PVC Tank) for domestic uses. Before use the stored water it should be treated with bleaching power. Thus collecting rainwater from a large no. of building will contribute a substantial quantum of water for domestic uses. Technical guidance in this respect may be sought from the Eastern Regional Office of Central Ground Water Board.