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Research Article

STATUS OF GROUND WATER HYDROLOGY OF LABPUR BLOCK, BIRBHUM DISTRICT

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ABSTRACT
Ground water is an important resource which not only sustains life by providing drinking water but also provides different other uses in different sectors like in agriculture, industry etc. But recently the ground water hydrological pattern has begun to change due to human interference. Groundwater irrigation in India has been expanding at a very rapid rate since the 1970's and the tube-wells have now become the single largest source of irrigation. Such huge draft of ground water by the tube-wells is responsible for lowering down the ground water layer every year. This paper reveals the present ground water status of Labpur Block as well as seasonal change of different properties of ground water like layer character, hydraulic head character, yield character etc. It is obvious from the ground water draft dynamic of Labpur block that huge ground water exploitation will deteriorate the ground hydrological character in near future.

Keywords: *Hydraulic Gradient, Equipotentiality of Ground Water, Ground Water Yield, Ground Water Draft, Ground Water Flow*

INTRODUCTION
Groundwater is an integral part of linked hydrologic, ecologic and human use systems. Ground water is, in fact, vital to public health, the environment, and the economy. Therefore it is essentially required not only for the sustenance of human life but also for the economic and social progress of a region. Approximately 75% of communities of the world's water systems rely on ground water (U.S. Environmental Protection Agency, 2002a).
Due to increasing population, urbanization, deforestation and industrialization pressure on this resource is continuously increasing. The available surface water resources are inadequate to meet all the water requirements for various purposes. It may be noted that not only the demand of ground water has increased over years but it seems that the demand will never cease. The present study attempts to analyze spatial pattern of the present seasonal ground water level fluctuation as well as its related yield capacity in the Labpur block of Birbhum district (vide location).
This block contains about 12% of both seasonal flood plain and inland wetlands. There may be a strong impact of wetland surface hydrology on ground hydrology in terms of ground water recharge, water level fluctuation as well as its yield capacity.

Location
Labpur is one of the largest block in Birbhum district of West Bengal which carries about 267 Km^2 area and its absolute location is 23^{O}42'44" N to 23^{O}53'46" N latitude and 87^{O}43'06" E to 87^{O}58' 02" E longitude (Figure 1).

Geophysical Identity of the Study Area
*Geology***:** Geologically Labpur has three types of geological formation a) Older alluvium with laterite b) Newer alluvium c) Older alluvium.
Physiography: Physiographically this region is characterized by three physiographic units
a. Lateritic patch in the western part of the block
b. Depressed land in the eastern part c. Rest part is characterized by alluvial plain.
Slope: Gentle slope which ranges between 39' to 10' from west to east in this block.
Climate: Seasonality of rainfall i.e. intensive rainfall during monsoon period makes an adverse flood situation almost in every year.
Pedology: Thick alluvium soils of recent origin covers almost the whole area.

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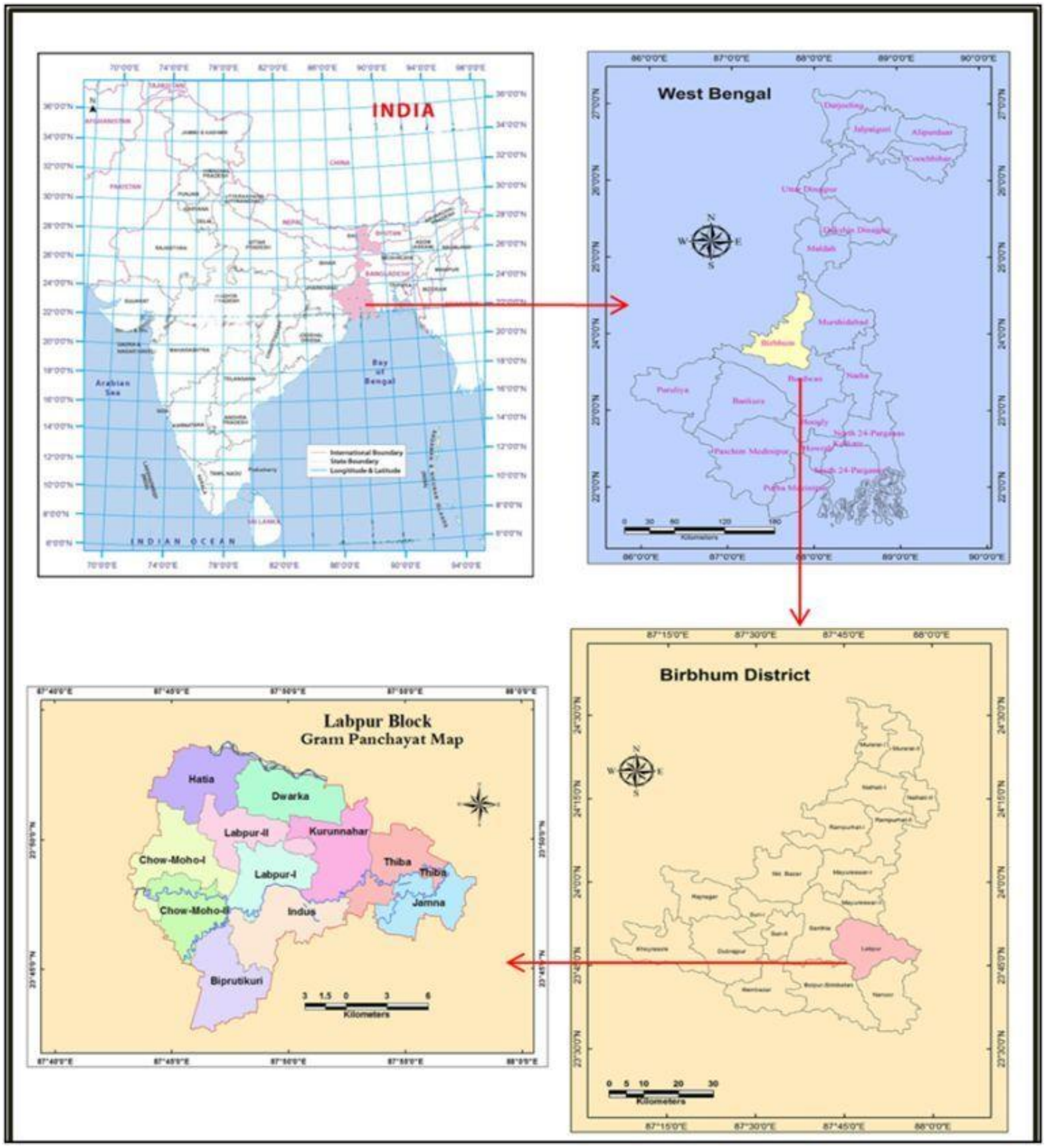

Figure 1: Location Map of the study area

MATERIALS AND METHODS

Data Base

a. Primary data: Primary data like water level fluctuation, ground water yield, lithologging data are collected from selected bore-wells of different panchaytes of Labpur block. Here 43 sample points have been selected. To collect ground water level and yield data following methods have been used:

i) Measuring tape with plum bulb has been used to measure ground water level both during pre and post monsoon period from the same sample point (Figure 2) (After Garber and Koopman, 1978).

ii) To measure water yield per second, water flow from submersible pumps have been collected by a container for a definite time and the collected water is subsequently measuredwith a measurement cylinder.

b. *Secondary data:* Secondary data is obtained from different official sources like P.H.E (Public Health Engineering) section of labpur block

Figure 2: Author is collecting the data of ground water level

Methodology

a. To show the relationship between seasonal water table and seasonal ground water yield simple correlation technique by Pearson has been implemented here.

b. Hydraulic heads can be determined by measuring the depth of the water table in groundwater well, usually a piezometer. To determine the hydraulic heads the following method has been used after Streamlines, the monthly Newsletter of Groudwater Software (Streamlinesvol.5, No.4).

Hydraulic head= Surface elevation of the Piezometer-Depth to the water from surface.

RESULTS AND DISCUSSION

Ground Water Table Dynamic

Temporal change of GWL is not adequate for spatial analysis of ground water at block level, empirical survey data has been considered to show the spatial pattern of seasonal fluctuation of ground water (Table 1).

The following table shows the seasonal changing of ground water pattern. Pre and post monsoon are taken into consideration because ground water fluctuation is acute due to changing recharge character and rainfall is the sole modulator for this.

The average ground water level in this block during 2014 prevails at the depth of 16.63 m and 12.07 m during monsoon and post-monsoon respectively. Monsoonal rainfall causes large scale ground water recharge which result into presence of GWL at very lower depth. Spatial discrimination can be observed throughout the block. Some of the maximum depths of ground water level can be observed at Labpur, Kurumba (16.76 m), Dwarka (16.45 m), Kusumgaria, PuratanMahugram (16.15 m), Bhalas, Chotogoga (15.24) etc. Huge draft of ground water for agricultural purposes and lithological characteristics are responsible for these high observed depths of GWL. (Vide table 6 and 2).

On the other hand, ground water prevail at a shallow depth in the villages like Mirity, Langolhata (6.09 m), Chaturbhujpur (7.62 m), Sitalgram (6.7 m) etc. Approximately 12% of the total area of the Labpur block is covered by wetlands. Majority of the wetlands are present in the eastern part of the block where the above mentioned places are located. Water stagnation for 4 or 3 months during monsoon season sustains the ground water aquifer in this region. But this scenario is being changed in recent time because of huge draft of ground water in the wetland areas for their economic purpose (vide table no.6)

Seasonal Changing pattern of Ground water level: Seasonal changes of ground water level varies between 9.15 m to 1.52 m.

Table 1: Seasonal pattern of Ground water dynamic with bore well in selected Bore well of Labpur Block

Pancahyet	Sample Village	Depth of bore well (m)	Depth of water table (m)		Rate of change	% of change
			Pre-monsoon	Post-monsoon		
Jamna	Jamna	30.48	13.72	8.53	5.19	60.84
	Mirity	27.43	9.14	6.09	3.05	50.08
	Kaichara	36.58	12.19	9.14	3.05	33.36
Thiba	Chaturbujpur	30.48	11.58	7.62	3.96	51.96
	Bogtore	39.62	15.24	11.28	3.96	35.10
	Nangolhata	36.57	10.66	6.09	4.57	75.04
Kurunnahar	Kurunnahar	48.76	18.28	13.71	4.57	33.33
	Sitalgram	24.38	9.14	6.7	2.44	36.41
	Salika	27.43	18.28	13.71	4.57	33.33
Labpur-I	Masthuli	51.81	15.54	12.08	3.46	28.64
	Bakul	45.72	19.81	15.24	4.57	29.98
	Labpur	57.91	19.81	16.76	3.05	18.19
Indus	Indus	27.43	15.24	10.66	4.58	42.96
	East Kadpur	19.81	13.71	12.19	1.52	12.46
	Lohada	27.43	15.24	10.66	4.58	42.96
	Donaipur	27.43	15.24	10.66	4.58	42.96
	Putundi	33.52	16.76	15.24	1.52	9.97
	Makaipur	27.43	15.24	9.14	6.1	66.73
Biprutikuri	Biprutikuri	30.48	15.84	10.66	5.18	48.59
	Talbona	39.62	10.67	6.09	4.58	75.20
	Kurumba	48.76	21.68	16.76	4.92	29.35
Dwarka	Dwarka	33.52	21.03	16.45	4.58	27.84
	Eguria	30.48	16.15	12.19	3.96	32.48
	Gunutia	27.73	20.72	14.63	6.09	41.62
Hatia	Laghosa	36.57	17.37	13.71	3.66	26.69
	Bhalkuti	39.62	19.81	14.93	4.88	32.68
	Durgapur	35.05	18.28	13.71	4.57	33.33
Chow-moho-I	Sekhampur	45.72	13.72	10.97	2.75	25.06
	Kusumgaria	36.58	22.25	16.15	6.1	37.77
	Chauhatta	36.58	17.67	14.32	3.35	23.39
	Ujjawalpur	24.38	15.29	10.14	5.15	50.78
	Faridpur	21.33	11.58	9.11	2.47	27.11
	Rajarampur	36.58	16.76	11.58	5.18	44.73
Labpur-II	Puratanmahugram	48.77	22.86	16.15	6.71	41.54
	Manpur	45.72	19.81	13.72	6.09	44.38
	Purana	33.53	19.81	13.72	6.09	44.38
	Chotogoga	35.05	21.33	15.24	6.09	39.96
	Bhalas	39.62	22.55	15.24	7.31	47.96
Chow-moho-II	Dhoadanga	27.43	13.71	12.19	1.52	12.46
	Altore	30.48	18.26	15.24	3.02	19.81
	Rakareswar	27.43	16.76	10.66	6.1	57.22
	Bamna	24.38	16.76	9.14	7.62	83.36

Source: PHE Section of Labpur Block and Field Survey, 2014

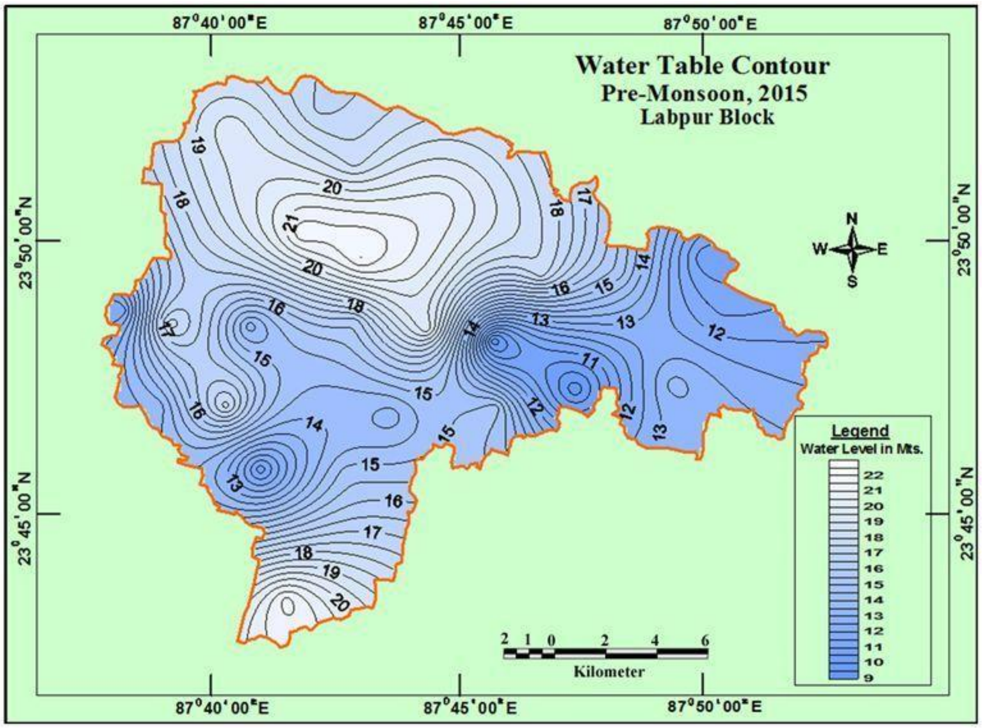

Figure 3: Ground water table contour during Pre-Monsoon

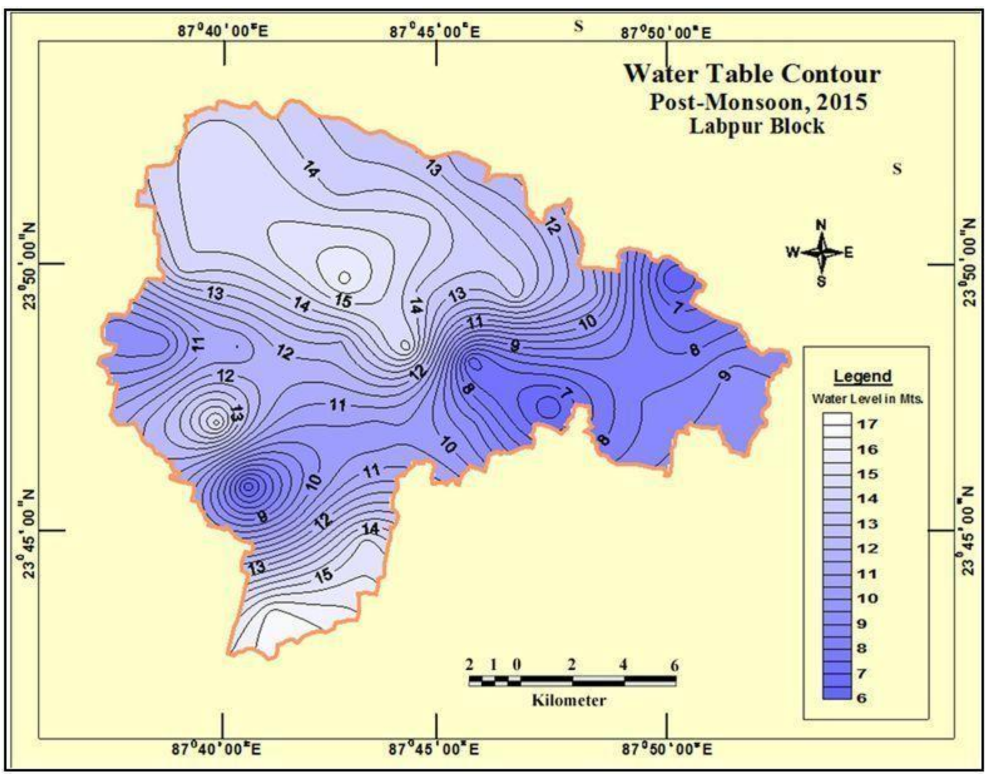

Figure 4: Ground water table contour during Post-Monsoon

In the Langolhatabeel area and at Talbonabeel the percentage of change of ground water is about 75% because the stagnated water helps in quick and high intensity recharge of ground water.

Table 2: Lithologging and Ground Water Level of Labpur Block

Name of the panchayet	Depth range from GL (Mts.)	Layer Description	Remark
Hatia	24.38-30.48	Coarse Sand	
	30.48-39.62	Medium Sand	Used for drinking water
Dwarka	24.38-30.48	Coarse Sand	
	30.48-39.62	Medium Sand	Used for drinking water
Labpur-I	18.29-24.38	Coarse Sand	
	30.48-36.58	Medium Sand	
	85.34-91.44	Fine Sand	Used for drinking water
Labpur-II	15.24-18.29	Coarse Sand	
	24.38-30.48	Medium Sand	
	36.58-51.82	Silt	Used for drinking water
Jamna	24.38-30.48	Medium Sand	
	33.53-39.62	Medium Sand	
	45.72-60.96	Medium Sand	Used for drinking water
Indus	18.29-21.34	Coarse Sand	
	24.38-27.43	Medium Sand	Used for drinking water
	36.58-48.77	Fine Sand	Used for drinking water
Biprutikuri	18.29-21.34	Coarse Sand	
	21.34-24.38	Coarse Sand	
	30.48-36.58	Coarse Sand	Used for drinking water
Thiba	18.28-21.34	Coarse Sand	
	24.38-30.48	Coarse Sand	Used for drinking water
	36.58-45.72	Fine Sand	Used for drinking water
Chauhatta-I	18.29-21.34	Medium Sand	
	36.58-42.67	Silt	
	45.72-54.86	Silt	Used for drinking water
	54.86-60.96	Clay	
	60.96-67.66	Clay	Used for drinking water
Chauhatta-II	12.19-15.24	Coarse Sand	
	18.29-21.34	Medium Sand	
	21.34-27.43	Medium Sand	
	30.48-44.19	Silt	
	48.78-54.86	Silt	Used for drinking water
	79.25-97.54	Fresh Fine Sand	Used for drinking water
Kurunnahar	24.38-30.48	Medium Sand	
	36.58-45.72	Medium Sand	Used for drinking water
	45.72-54.86	Fine Sand	Used for drinking water

Source: P.H.E Section of Labpur Block

The areas like Kurunnahar, Salika, East kadpur, Putundi, Dwarka etc. have low to very low change of seasonal ground water (Table 1) because of less aggressive irrigation and diversification of crops. The spatial pattern of ground water shows (Figure 3 and 4) shows that the status of ground water level potentiality is very good in the beel areas like Langolhatabeel area, patharghatabeel area, Talbonabeel area under the panchyets of Thiba, Chow-Moho-II and Biprutikuri respectively. Whereas in the upland areas like Kurumba, Labpur, Hatia in Biprutikuri, Labpur-II and Hatia panchayet respectively, the ground water level is in critical condition due to less ponding time of water as well as intensive irrigation.

Lithologging Condition: Ground water potentialities and its position largely depends on the geological stratification, composition of strata, infiltration circumstances, water retention capacity, presence and

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alignment of aquifer and aquiclude (impermeable hard layer) layers (Pal, 2009). Lithologging character of this block is not uniform due to its differential geological character. The average potential layers of this block are located at the depth of i) 12.19-24.38 mts ii) 30.48-42.67 mts. iii) 54.86-67.06 mts.

Table 2 shows that in panchayets first layer is composed of coarse sand. The lithological conditions are not same in all pachyets. Hatia and Dwarka have only two potential layers and the second layer is used for drinking water purpose. Only Chauhatta-II is composed of six potential layers and grade of sand become going to be decreased with the changing of layers from the surface. Here fifth and sixth layers are used for drinking water purpose. Rest of the panchyets are composed of 3 layers and the 2nd and 3rd layers are used for drinking water purpose. In all panchyets the first layers remain unused for drinking water because coarse sand helps to filter the surface water which reaches to the second layer.

Spatial Pattern of Equipotential lines and base flow direction: The line which joins equal hydraulic heads constant is known as equipotential line. Hydraulic head or piezometric head is a specific measurement of liquid pressure above a geodetic datum. It is usually measured as a liquid surface elevation, expressed in the units of length, at the entrance (or bottom) of a piezometer. In an aquifer, it can be calculated from the depth to water in a piezometric well and from the given information of the piezometer's elevation and screen depth (Vide methodology). Hydraulic head can similarly be measured in a column of water using a standpipe piezometer by measuring the height of the water surface in the tube relative to a common datum. The hydraulic head can be used to determine a *hydraulic gradient* between two or more points (Pal, 2009).

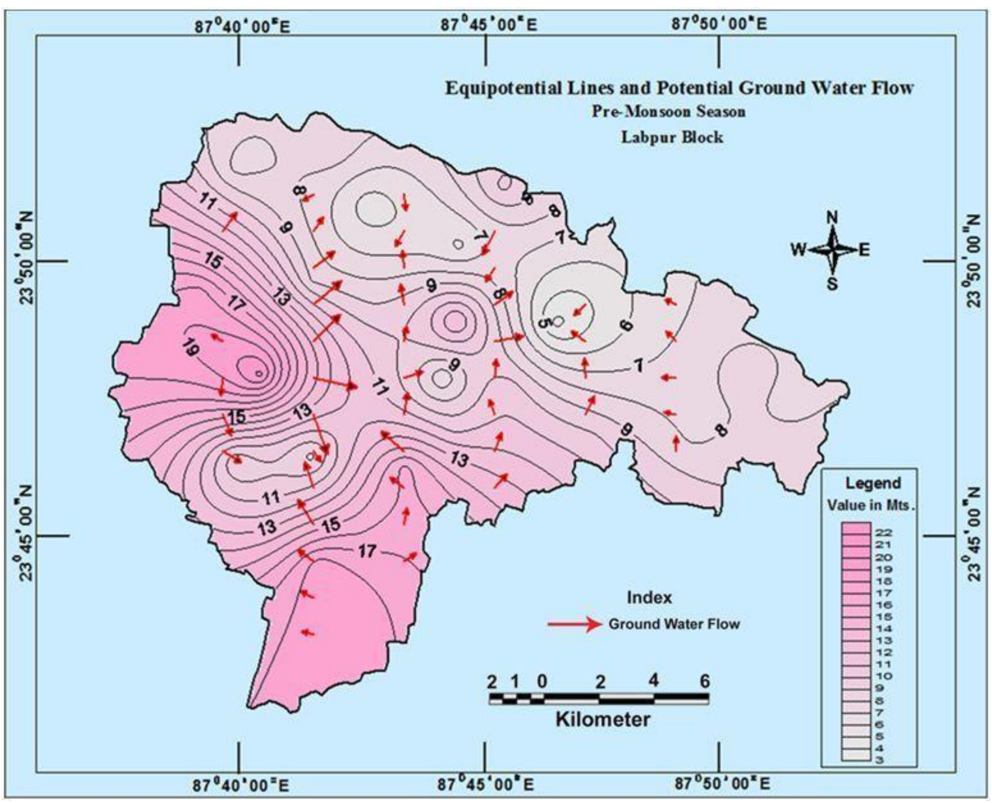

Figure 5: Equipotential Lines during pre-monsoon

In order to define groundwater flow directions the gradient between higher hydraulic heads (i.e. from higher energy) and lower hydraulic heads (i.e. to lower energy) has to be determined.Therefore groundwater flow has two major physical properties: Hydraulic conductivity and Specific yield. Hydraulic conductivity is the rate at which water flows through porous media (soil and porous or fractured rock) and is expressed in velocity units (meters per second; feet per second). Specific yield is

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the free-draining pore-water volume, expressed in per unit of total volume. An aquifer with large values of either hydraulic conductivity or specific yield, or both, can release large quantities of water to wells or springs (Ponce, 2006).

In Labpur block the potentiometric map also provides clues about the rate of groundwater flow. Both Pre-monsoon and post monsoon season equipotential pattern (Figure 5 and 6) have the tendency to flow ground water same as the surface water flow. It may prove that human interferences do not diverse the pattern of ground water flow. It also prove that flow pattern of ground water is towards the flood plain wetlands e.g. it flows towards the eastern part of the block i.e. towards Langolhatabeel, Patharghatabeel, Panchparabeel.

The another fact also reveals from the equipotential lines that at the low equipotential gradient, ground water flow is not confined, which means ground water aquifer is unconfined in this block.

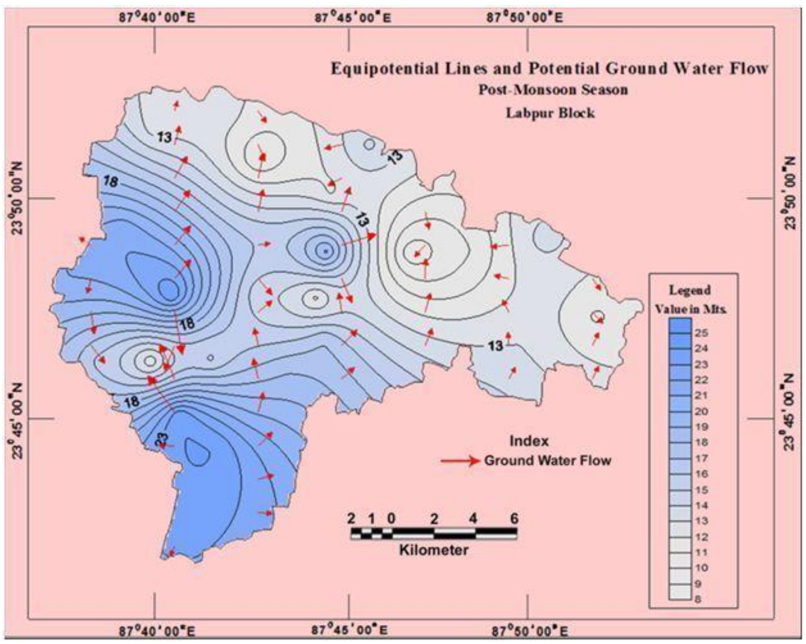

Figure 6: Equipotential Lines during post-monsoon

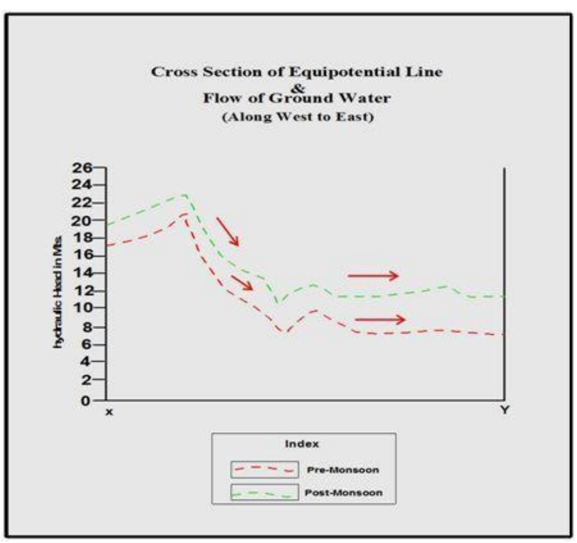

Figure 7: East-West Cross Section of Equipotential Line

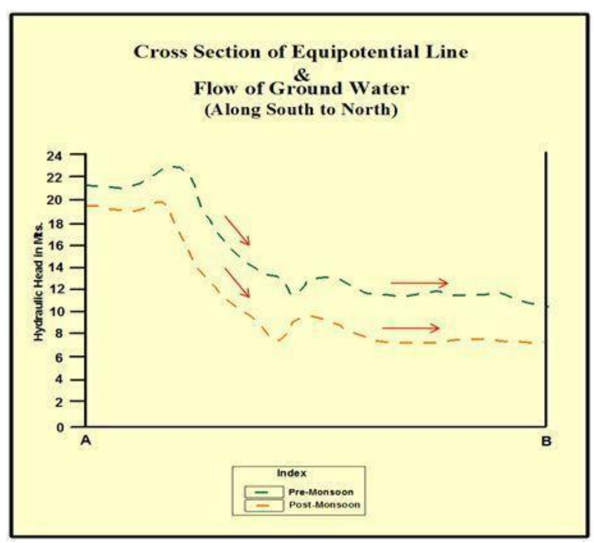

Figure 8: South-North Cross Section of Equipotential Line

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Table 3: Piezometric Potential of Ground water during Pre-monsoon and Post-Monsoon Period

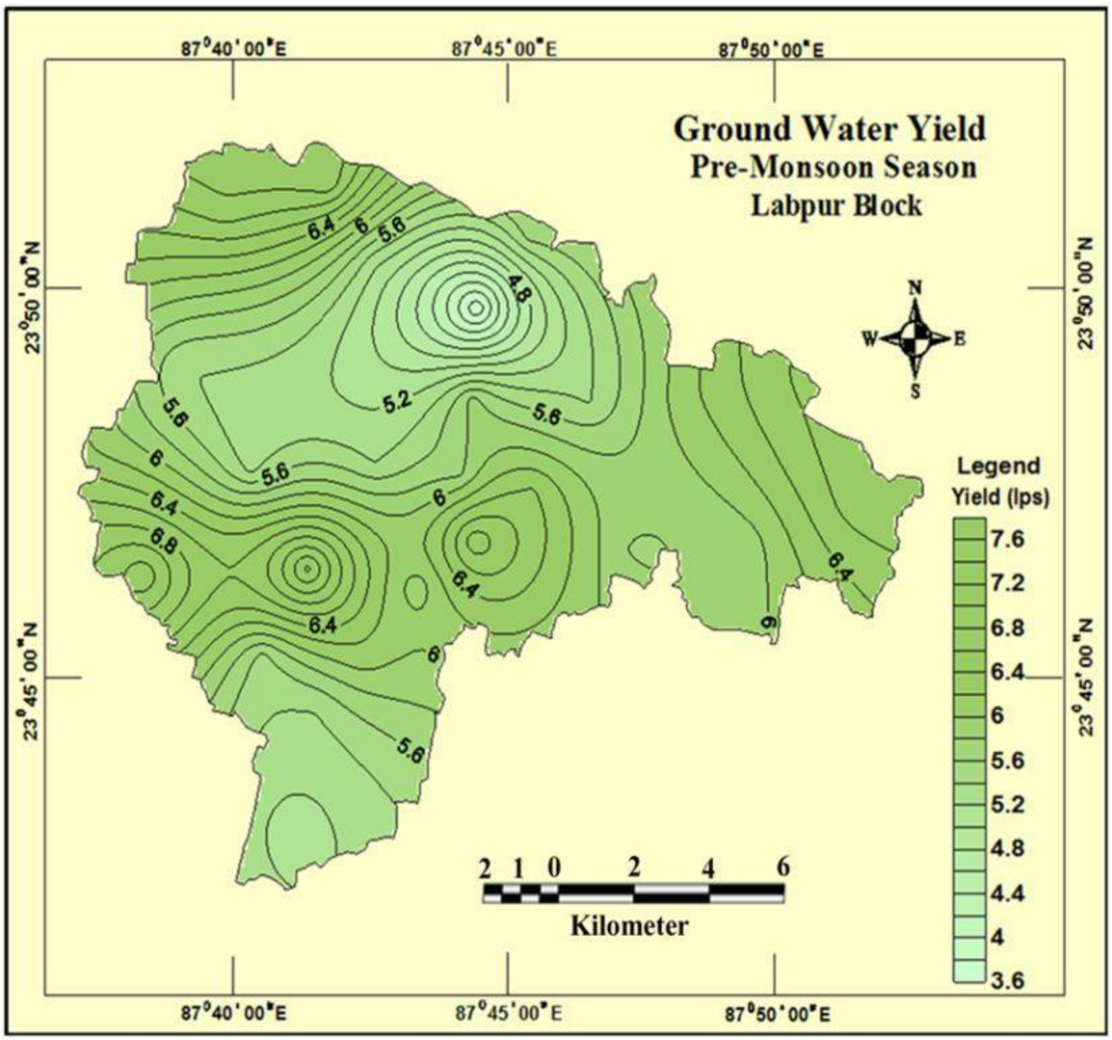
Pancahyet	Sample Village	Spot height (m)	Depth of water table (m)		Piezometric potential or hydraulic head (m.)	
			Pre-monsoon	Post-monsoon	Pre-monsoon	Post-monsoon
Jamna	Jamna	21.5	13.72	8.9	7.78	12.6
	Mirity	19.5	9.14	6.09	10.36	13.41
	Kaichara	20	12.19	8.1	7.81	11.9
Thiba	Chaturbujpur	20	11.58	7.62	8.42	12.38
	Bogtore	21.4	15.24	11.28	6.16	10.12
	Nangolhata	19.5	10.66	6.09	8.84	13.41
Kurunnahar	Kurunnahar	22	18.28	13.71	3.72	8.29
	Sitalgram	20	9.14	6.7	10.86	13.3
Labpur-I	Salika	20.5	18.28	13.71	2.22	6.79
	Masthuli	26	15.54	12.08	10.46	13.92
	Bakul	27	19.81	15.24	7.19	11.76
	Labpur	31	19.81	16.76	11.19	14.24
Indus	Indus	31	15.24	10.66	15.76	20.34
	East Kadpur	30	13.71	12.19	16.29	17.81
	Lohada	24	15.24	10.66	8.76	13.34
	Donaipur	25.5	15.35	10.66	10.15	19.34
	Putundi	26	16.76	15.24	9.24	10.76
Biprutikuri	Makaipur	26	14.21	9.14	11.79	16.86
	Biprutikuri	34.5	15.84	10.66	18.66	23.84
	Talbona	23.5	10.67	6.09	12.83	23.91
	Kurumba	40	21.68	16.76	18.32	23.24
Dwarka	Dwarka	26.5	21.03	16.45	5.47	10.05
	Eguria	26.4	16.15	12.19	10.25	14.21
	Gunutia	26.5	20.72	14.63	5.78	11.87
Hatia	Laghosa	26.2	17.37	13.71	8.83	12.49
	Bhalkuti	27.5	19.81	14.93	7.69	12.57
	Durgapur	26.5	18.28	13.71	8.22	12.79
Chow-moho-I	Sekhampur	35	13.72	10.97	21.28	24.03
	Kusumgaria	35.5	22.25	16.15	13.25	19.35
	Chauhatta	36	17.67	14.32	18.33	21.68
	Ujjawalpur	35.5	15.29	10.14	20.21	25.36
	Faridpur	30	11.58	9.11	18.42	20.89
Labpur-II	Rajarampur	28	16.76	11.58	11.24	16.42
	Puratanmahugram	32	22.86	16.15	9.14	15.85
	Manpur	33	19.81	13.72	13.19	19.28
	Purana	31.5	19.81	13.72	11.69	17.78
	Chotogoga	30.5	21.33	15.24	9.17	15.26
	Bhalas	31.5	22.55	15.24	8.95	16.26
Chow-moho-II	Dhoadanga	28	13.71	12.19	14.29	15.81
	Altore	27.5	18.26	15.24	9.24	12.26
	Rakareswar	25.5	16.76	10.66	8.74	14.84
	Bamna	26	16.76	9.14	9.24	16.86

Source: PHE Section of Labpur Block and calculation by the author

Figure 7 and 8 show the cross sections of equipotential lines along both west to east and south to north during monsoon and post-monsoon period. In west to east cross section, high hydraulic pressure prevails at the western part but it becomes lower down towards the east where wetlands prevail. Same situation can be found along south to north cross section. Here water flows from south to north due to its hydraulic gradient.

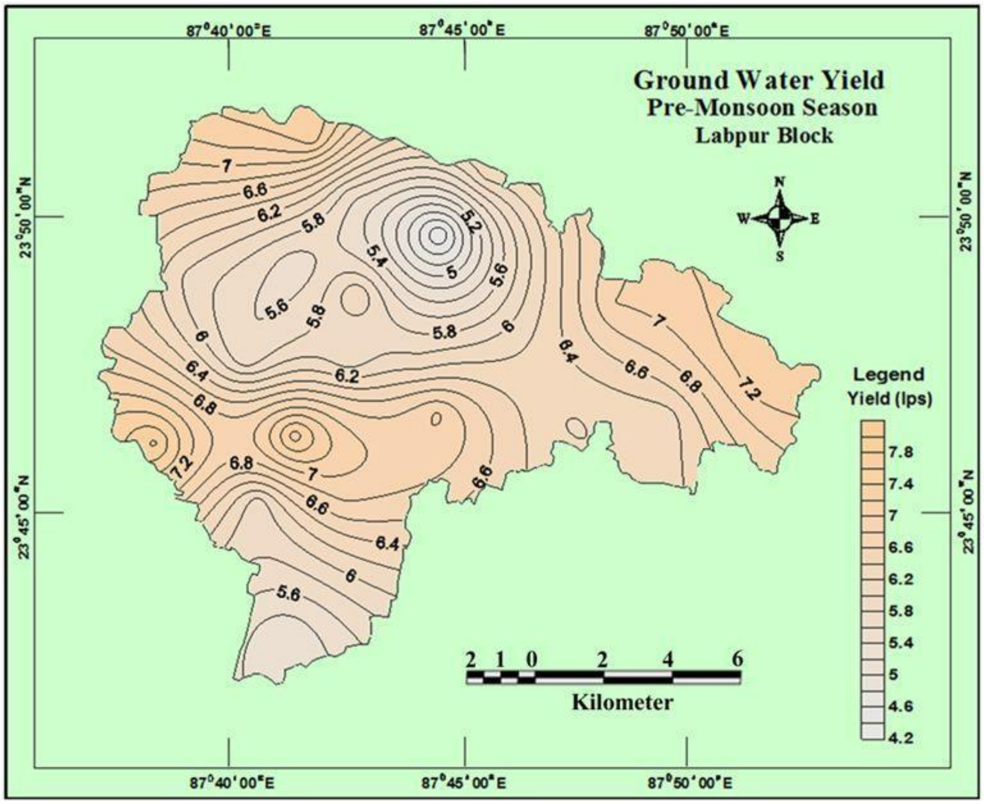
Ground water yield and Production dynamic: According Government's regulation on `STW or SMP should have 3.5 HP power for irrigation purpose, Shallow Tube well (STW) or Submersibel Pump (SMP) have a specific yield capacity depending upon textural soil composition, supply of water to the bore well, depth of bore well etc. It is evident that there should be dynamicity of yield capacity during pre and post monsoon period.

Primary data of ground water yield reveals the fact that in Labpur block water yield ranges between 5.43 lps to 7.01 lps and 5.39 lps to 7.78 lps during pre-monsoon and post-monsoon respectively (Figure 9 & 10). Water yield is much higher at Thiba, Jamna, Chow-Moho-II and Hatia panchayet because different wetlands like Langolhatabeel, Patharghatabeel etc. provide large scale ponding time as well as perfect ground water layering condition. Yield capacity is very poor at Dwarka panchayet during both seasons because of its lithologging character as well as higher rate of ground water lowering due to irrigation (Table 2 & 6).



Source: Based on field work

Figure 9: Pre-Monsoon ground water yield



Source: Based on field work

Figure 10: Post-Monsoon ground water yield

*Relational matrix between ground water layer and yield dynamic***:** Relational matrix analysis between GWT depth and water yield both in monsoon and pre-monsoon period have identified a prominent relation between them. There is a negative relation between GWT depth and water yield both during monsoon and pre-monsoon periods. Table 4 shows quantitative measure of relation matrix which depicts that the correlation values vary between -0.1 to – 1 (Table 4). So, it is obvious that if we use to decrease the water level depth of bore wells, the yield capacity will be increased many more time than present especially during post-monsoon season.

In the beel area the relationship is highly negative in nature, e.g. in Langolhatabeel and in Patharghatabeel area the value of correlation is -0.9 and -1 respectively during both monsoon and post monsoon period which indicate these regions have very good ground water potentiality which can be utilized for future ground water sustainability.

Ground water draft dynamic**:** India is now the largest user of groundwater for agriculture in the world (Shankar *et al.*, 2011). At present 64 % of the country's population depends on agriculture for their source of livelihood (Ahmed *et al.*, 2013). Groundwater irrigation has been expanding at a very rapid rate since the 1970's and emerged as the primary democratic source for poverty reduction tool in India's rural areas (Ahmed *et al.*, 2013). The farmers have the full control over the groundwater irrigation which led to the huge withdrawal of groundwater during the last 40 years (Acharyya and Shah, 2010). According to the Agricultural Census of India (2005-06), 60.4 % of the net irrigated area is irrigated using groundwater in India (Sekhri, 2012). So, here ground water draft due to irrigation purpose is calculated on the basis of three parameters 1. Average yield capacity of the panchayets 2. Numbers of STW (Shallow Tube Well) or SMP (Submersible Pump) 3. Running times of STW and SMP. There are 1864 STW or SNP through the block (Table 5). During pre-monsoon all the STW are running with an average time of 18 hours per day and during post-monsoon some of STW are remained deactivated due to water logging condition in the beel area.

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Table 4: Relational Matrix between Ground water layer and Ground water Yield

Pancahyet	Sample village	Depth of water table (m)		Water yield (lps)		r value	
		Pre-monsoon	Post-monsoon	Pre-monsoon	Post-monsoon	Pre-monsoon	Post-monsoon
Jamna	Jamna	13.72	8.9	5.68	6.1	-0.17	-0.12
	Mirity	9.14	6.09	5.98	6.5		
	Kaichara	12.19	8.1	6.5	7.2		
Thiba	Chaturbujpur	11.58	7.62	6.51	7.15	-0.99	-0.99
	Bogtore	15.24	11.28	6.13	7		
	Nangolhata	10.66	6.09	6.56	7.18		
Kurunnahar	Kurunnahar	18.28	13.71	5.39	6.1	-0.98	-0.96
	Sitalgram	9.14	6.7	6.4	6.95		
	Salika	18.28	13.71	5.6	5.81		
Labpur-I	Masthuli	15.54	12.08	6.21	6.54	-0.91	-0.99
	Bakul	19.81	15.24	5.74	6.1		
	Labpur	19.81	16.76	5.4	5.8		
Indus	Indus	15.24	10.66	6.1	6.75	-0.98	-0.73
	Donaipur	15.35	10.66	5.79	6.12		
	Dula sahapur	14.21	9.14	6.94	7.03		
Biprutikuri	Biprutikuri	15.84	10.66	5.43	5.97	-0.97	-0.82
	Talbona	10.67	6.09	5.54	5.89		
	Kurumba	21.68	16.76	5.12	5.52		
Dwarka	Dwarka	21.03	16.45	5.28	5.7	-0.6	-0.34
	Eguria	16.15	12.19	5.67	6.28		
	Gunutia	20.72	14.63	3.64	4.2		
Hatia	Laghosa	17.37	13.71	7.1	7.5	-1	-1
	Bhalkuti	19.81	14.93	6.92	7.1		
Chow-Moho-I	Sekhampur	13.72	10.97	5.41	5.6	-0.24	-0.48
	Chauhatta	17.67	14.32	5.61	5.95		
	Faridpur	11.58	9.11	6.15	6.72		
	Rajarampur	16.76	11.58	6.07	6.51		
Labpur-II	Manpur	19.81	13.72	5.85	6.2	-0.98	-0.89
	Chotogoga	21.33	15.24	5.32	5.79		
	Bhalas	22.55	15.24	5.12	5.46		
Chow-Moho-II	Dhoadanga	13.71	12.19	7.51	7.71	-1	-1
	Rakareswar	16.76	10.66	7.35	7.84		

Source: Calculate by the author

Table 6 and Figure 11 show that highest ground water draft is the characteristics feature of Kurunnahar, Indus, Biprutikuriwhich ranges between 12.75 ham (hectare-meter) to 9.62 ham during pre-monsoon and 10.49 ham to 8.08 ham during post-monsoon because of intensive agriculture as well as there are no other means of agricultural aid.

It can be also said that the soil is not so much fertile like Thiba, Jamna, Hatia and Chow-Moho-II panchayet as a result huge amount of ground water require making soil fertile by application of high dose chemical fertilizer. On the other hand, presence of wetland as well as river water ground water draft is less which ranges between 2.67 ham to 4.06 ham and 2.35 ham to 1.57 ham during pre and post monsoon respectively. In Labpur-I block the water draft is less (3.18 and 2.63 ham during pre and post monsoon).

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Table 5: No of Shallow Tube Well in Different panchayets, 2014-15

GP	No of STW/SMP	
	Pre-Monsoon	**Post-Monsoon**
Jamna	179	135
Thiba	98	44
kurunnahar	322	322
Labpur-I	85	85
Indus	314	314
Biprutikuri	277	277
Dwarka	270	250
Hatia	75	75
Chow-Moho-I	78	78
Labpur-II	90	90
Chow-Moho-II	76	60

Source: Electric office, Ahmadpur and Labpur

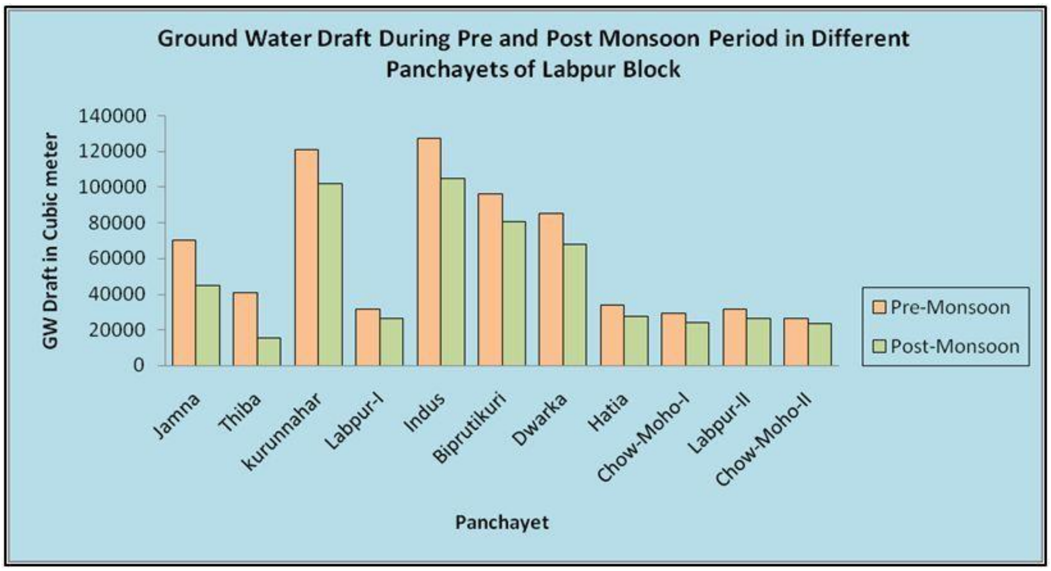

Figure 11: Ground water draft in different Panchayets of Labpur Block

Table 6: Ground water draft during Pre-monsoon and Post-monsoon period for agricultural purpose

GP	Ground Water draft in Cm3		Ground Water draft in ham (hectare-meter)	
	Pre-Monsoon	**Post-Monsoon**	**Pre-Monsoon**	**Post-Monsoon**
Jamna	70175.16	44906.4	7.01	4.49
Thiba	40642.56	15767.13	4.06	1.57
kurunnahar	120811.824	102079.15	12.08	10.21
Labpur-I	31836.24	26346.6	3.18	2.63
Indus	127576.944	104923.72	12.75	10.49
Biprutikuri	96209.856	80833.03	9.62	8.08
Dwarka	85030.56	67914	8.50	6.79
Hatia	34068.6	27594	3.41	2.75
Chow-Moho-I	29366.064	23941.008	2.93	2.39
Labpur-II	31667.76	26399.52	3.16	2.63
Chow-Moho-II	26741.664	23526.72	2.67	2.35

Source: Calculated by the author

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Major Findings: This study reveals the following major findings

i. Labpur Block is characterized by unconfined aquifer.
ii. Equipotential lines as well as ground water flow maintian the surface slope direction.
iii. Hydraullic pressure is very low towards the wetland area.
iv. Ground water yield is strongly controlled by water layering system during both monsoon and post-monsoon period.
v. Ground water draft has increased due to intensive agriculture as well as modern agricultural inputs.

Conclusion

The status of ground water in Labpur block by all means show a negetative trends regarding ground water potentiality. Over exploitation of ground water for the production of HYV seeds as well as detorioration of wetlands and irregular rainfall pattern not only hampered the ground water layer, but also detoriorate the quality of ground water, which may cause various kinds of health hazards to the human being. Therefore it is high time to think about ground water potentiality development and bold measures promoting bettersustainablity of groundwater in this region.

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