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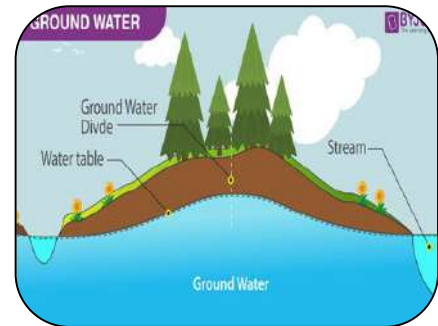
GROUNDWATER SHORTFALL AT BERHAMPUR, MURSHIDABAD WEST BENGAL, AND REMEDIAL MEASURES TO MITIGATE THE PROBLEM

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ABSTRACT:

Considering the landscape architecture the British rulers selected the location along the levee of Bhagirathi River as an army cantonment. The origin of Berhampur established as an army cantonment. Prior to the establishment of this town Cossimbazar, Monindranagar, Hatinagar, Babulbons, Soidabad were the location of traders, Manly British, other clans were Portuguese, Danish, Vatia, Marwari, & Hindu traders. To support the British rulers mainly Hindu Jamiders took the vital role on trade & commerce with the foreigners. For the service of the aforesaid social groups concentration of population gradually increasing. After the establishment of railway links flux of population rapidly increased. After the partition of Bengal concentration of refugees increased the population. Thus the requirement of quality water demand increased both for domestic & agricultural works, small cottage industry & various commercial & other sectors rapidly increased, in flux of refugees rapidly increased also the rural population concentration. Lifting of ground water for various purposes gradually increased the use of water, naturally demand for water increased.



KEY WORDS: Ground water, FAR, Social Upliftment, Satellite Imagery.

INTRODUCTION: -

During the British rule Berhampore was known as a Cantonment. Cossimbazar, Bishnupur, Khagra, Babulbona, Hatinagar etc. were the big business centers. Due to an administrative center, the public concentration, growth of urbanization, trade and commerce, growth of economic activity rapidly increased at Berhampore as a service center. During British rule service sector Berhampore gradually increased, Pond water, Dug wells, were the common source of drinking water for all level of people. As per geological review the ground water level was in a good source for both domestic and other use. The growth of population after 1937 rapidly increased. For agricultural use, industrial use, in all sector of human life style

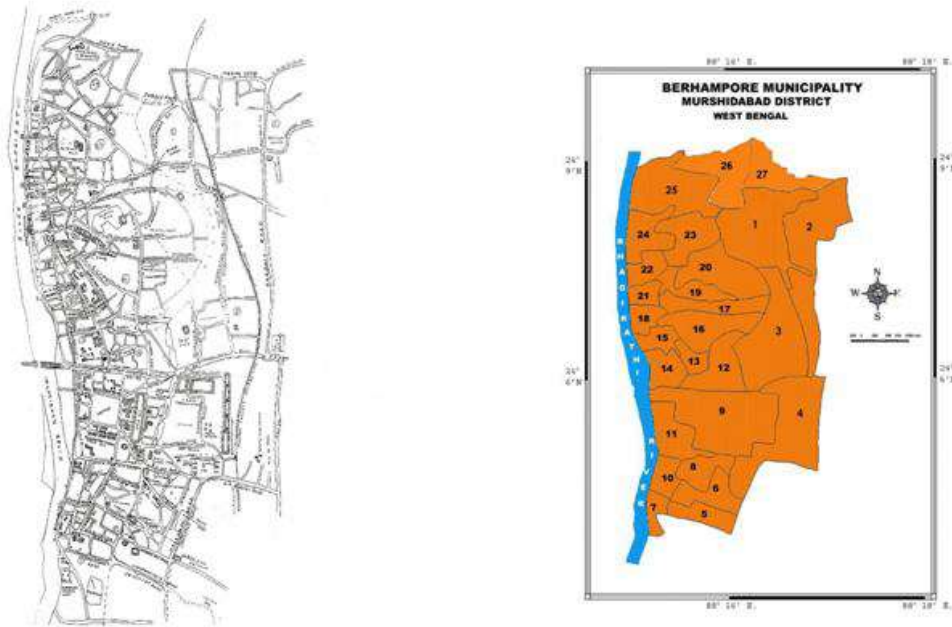
demand of water increased. From the mid of 1988, population concentration made the demand more. Industry, population growth in rural sector, demand for rural water supply both in villages, and agriculture fields , reckless use of ground water made the situation gradually grave. In present situation nearby Bills in and around of Berhampore, are suffering for the shortfall of water. Moreover, solid, liquid, and other wastes are reduced the percolation rate to ground water.

BERHAMPORE AND GROUND WATER -

The upper surface of the ground water is called as water table. The water table conforms roughly to the topography of the land, but its depth depends on number of factors. The major factor is infiltration. It depends on the following 1) intensity of rainfall, 2) duration of rainfall 3) temperature, 4) soil characteristics, 5) vegetation cover, 6) urban area ,7) depth a surface, 8) detention and thickness of saturated area, 9) entrapped air in soil pores, 10) turbidity of water, 11) compaction of soil, 12) geology, 13) slope of rock structure, 14) water holding capacity etc.

In the geological setup hydrology reacts. The water table conspicuously fluctuates from season to season and in situation. The drought,- heavy human consumption lead withdraw of ground water, thus water table sinks to deeper levels. The rate of fluxion depends on the rate of movement of ground water, varying from few centimeters to tend of a meter per day. The movement of ground water is governed by permeability by of the medium and its ability to allow passage of water without impairment of structure of soil or rock fabric of the medium. The nature of land use in Berhampore is not methodical, changing of slope created various problems on runoff, flow direction, water stagnation is now very common feature at Berhampore.

Map: Land use map of Berhampore Municipality



To consider the location of Berhampore prior to British rule in early records of the district, prepared by "Walls" that the location of Berhempore was at the west of Bhagirathi attached to Gokarno

Mouzas. In many time Bhagirathi changed its entry in Murshidabad. The three major shifting were Chukka, Suti and Chaurasia.

To consider the geomorphology of Berhampore town, the base had been founded by Mayurakhy, Bremhani and The South West build by Ajoy.

Prior to Holocene age 18, 000 years gradually the zone developed. The impact of Pleistocene age took the major role of foundation. 20 thousand years ago.

ORIGIN OF BERHAMPORE –

In 1914 Omal published a compiled, gazette where he mentioned the name of Sayed Cossim, an unknown fakir, he is known in Jangipur as Sayed Cossim. Another Cossim was known as a Pir a resident of Cossimbazar, probably his full name was Sayed Khaja comim Fakir Darbesi Ala. The name of Cossimbazar probably came out of the name of those persons. In 1556 East India Company build a company. Quarter, known as Khunti where the administrator was John Ken. Job Charnak at that time was the fourth employee of East India Company. Charnak was trams ferried to Patna and again he returned in 1680 at Cossimbazar. In 1681 the East India Company invested 140000 pound as business capital. When Murshidabad became the capital the British resident took the responsibility of administration and their residence was known as Residency. During the time of Charnak regime the trade at Cossimbazar increased rapidly. And after Palacy war Cossimbazar became the main trade center, mainly for silk, spices etc.

Not only the European traders, Marwari, Gujarati, Bihari traders also came in Cossimbazar, for their business. Their residential areas was known as Mahajan Tuli.

In 1813 Bhagirathi suddenly changed her course, and the flow along. Katiganga stopped. Due to the epidemic 3/4 of the total population lost their life and the best trade entre of Bengal destroyed. The total Cossimbazar became a dilapidated town. The waste raw materials of Cossimbazar then used as building material for the construction of Berhampore. On the basis of the two Cossimbazar Rajbaries namely, Sripur and Baspur the trade again able to rejuvenated. But not up to the old status. Apart from Cossimbazar the adjacent areas like Bishnupur, Madhupur, Kantanagar, and Khagra became the small trade and residential centers.

SOCIAL UPLIFTMENT OF BERHAMPORE –

Due to the British rule in Bengal for their service they created a new middle class Bengali people. The role of business strategies of East India Company gradually increased.

Started controlling the economic activity and administrative modification, gradually increase in the new middle class people at Bengal. These population originated mainly in Dhaka and Kolkata, but the development of Berhampore town in Murshidabad is the mark of multi-dimensional progress of the middle class people where the concentration of business trend flourished. From 1917 due to the famine the trade, policies, culture, administration judiciary almost closed, or rapidly almost abolished. The British rulers shifted their administration at Calcutta then to Delhi.

Gradually the importance of Berhampore became for the accommodation place of scattered Nawab family members. In a short spell the wholesale trading started improving for Silk, Muslin trading. Bell metal and bullion gold traders but that trading gradually came under the control of British rulers.

The settlement pattern of Berhampore in many time sifted due to the various reasons. From the end of 19th century the cantonment remove from Berhampore and gradually the market economy of Gorabazar reduced, and old shops serving the soldiers and British people were closed.

During early days the Gorabazar was mainly the residential area of north Indian Muslims and the Hindu shop owners. In 1862 to 1872 the Azimganj- Nalhati railway line was established and land price of Berhampore started increasing rapidly. The affluent society of both Hindu and Muslims purchased land at

Berhampore at high price. In the settlement report of 1897- 98 it was recorded that the house rent was high at Khagra and Berhampore. In comparison the rent was low at Gorabazar.

From 1906 to 1907 Lalgola - Sealdah railway line was established and Berhampore became the distribution center of goods. Naturally the importance of Berhampore rapidly increased and population also increased for the service sectors. During the Second World War the population concentration in Berhampore suddenly increased for the safe shelter of the people.

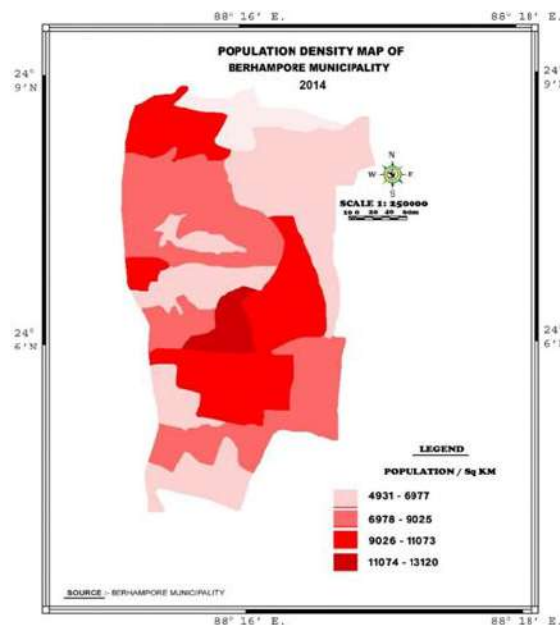
The Berhampore is the source of income of various sectors of trade and commerce. An influx of refugees after partition the business on gold and bell metal increased all over the district and a new horizon of economic activity flourished.

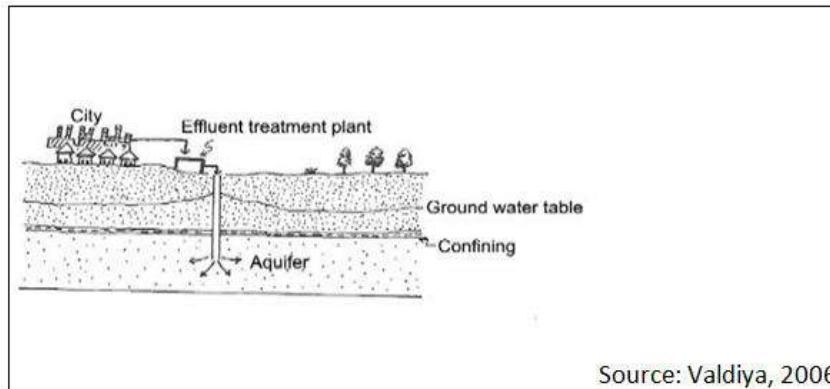
For the service and trade and commerce and other economic sectors, a new class of citizens gradually increased in Berhampore those were unorganized labor, mainly bus drivers, truck drivers, porters, rickshaw poolers, sweepers, servants etc. gradually started concentrating.

Due to the establishment of British rule the agricultural based rural economy reduced their functional activity. Establishment of industry gradually forced to concentrate rural black smith, carpenter, waiver, earthen pot maker for their earning and started concentrating at Berhampore. For the clearing of sewerage and night soil and for supply of drinking water they established cantonment and civil line. In the beginning of British rule, they shattered the local administration of urban and rural places. But in 1932 the British rulers established Bengal Municipality Act. Gradually vide notification no. LB 856354 dated 12th Dec, 1868. On 1st Apr. 1869 accumulation of local. Residential areas they demarcated the municipal area and established cantonment and town committee. The British rulers shifted subsidiary treasury circuit court sadar dewani and nijamat adulate at Calcutta but for the administrative reason again they started functioning at Berhampore

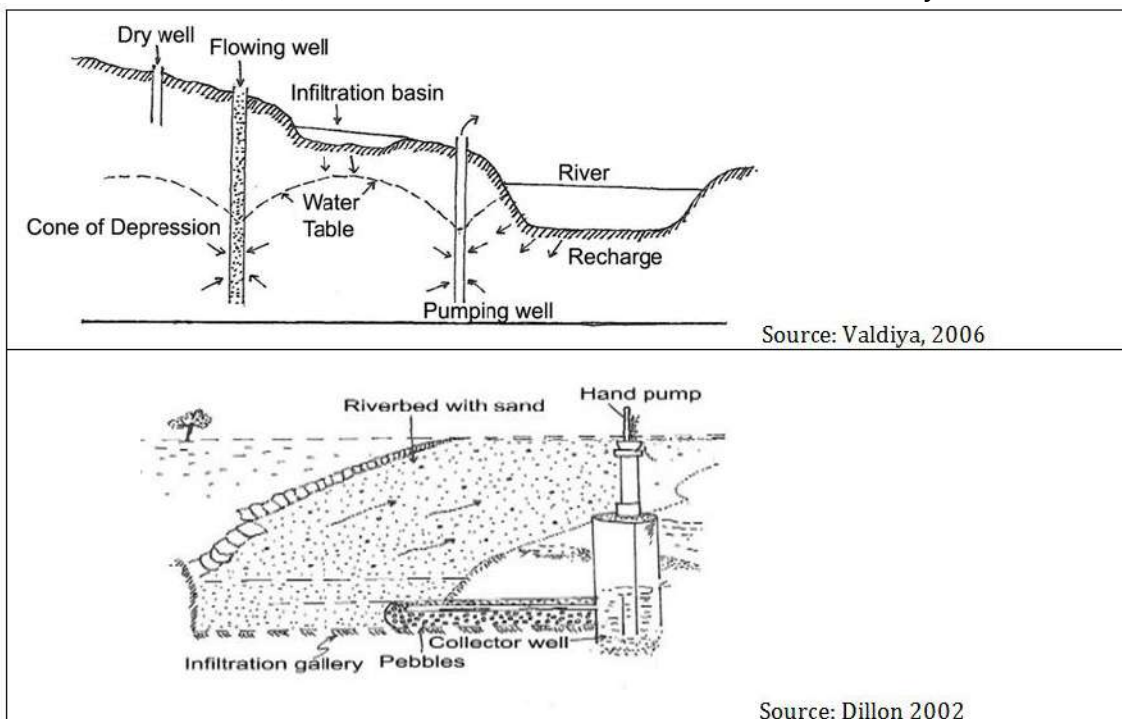
In 1876, 1st July they established Berhampore Municipality. The total members were 19, out of which 5 were nominated during 1876 there were 6 wards in Berhampore, Gorabazar no 3, cantonment 1, Berhampore 4, Khagra 3, Saidabad 2, and Cossimbazar 1.

Map: Ward wise Population at Berhampore



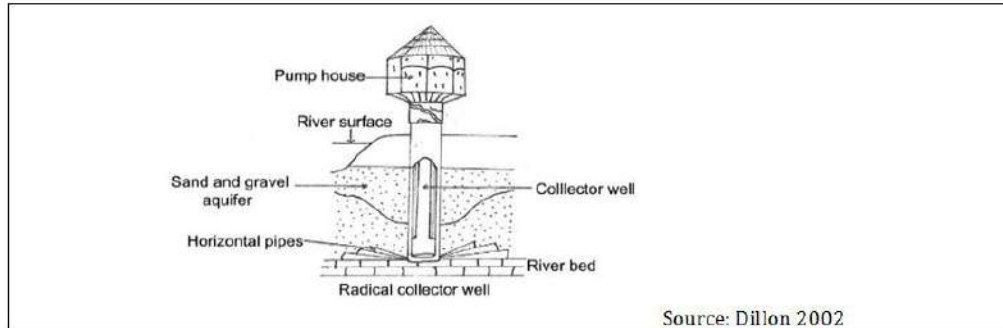


Due to the rapid growth of urbanization, the requirement of water rapidly increased, deep tub wells became the only immediate solution for urban water supply. But the growth of population in villages of Murshidabad increased the demand for water. Water for domestic, industrial, agriculture, and for other use increased, like building construction, road, cleaning of various automobile servicing, administrative installations and many other purposes. For the aforesaid reasons installation of deep tube wells rapidly increased, reasons are-- for social and political issues. Due to the overuse many problem crop. The cones are formed for over succession, thus the wells become out of order in two to three years.

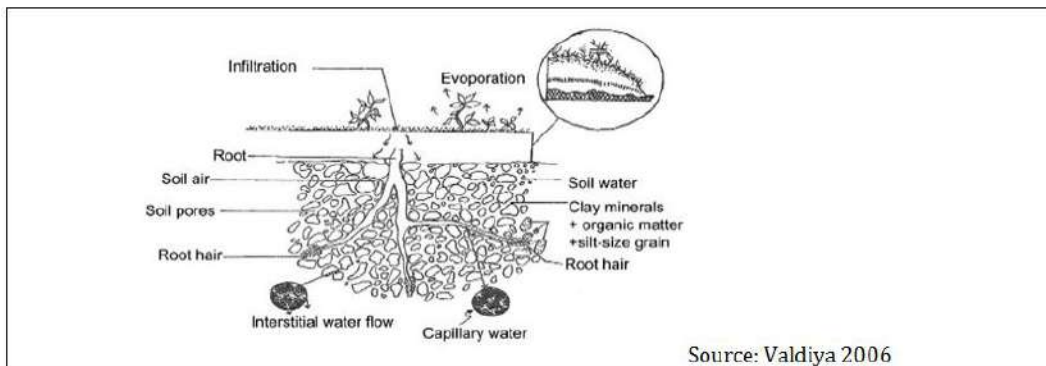


It has been recorded that in many situations without having the opportunity of river lift, deep tube wells are being installed, the use of shallow tube wells for all purpose use rapidly increased without any planning. More over people are not aware of misuse of water. All these happened and happening till today. In many situation ignoring the future consequences, by the name of NREGA project, people collecting soil from Vairab river bed from placeless, without any planning. Moreover these are happening without any

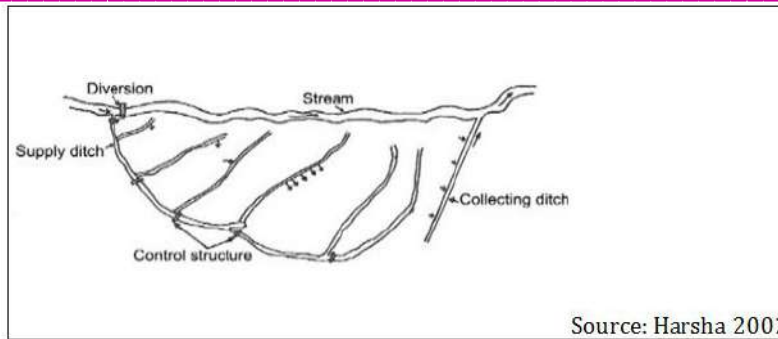
permission of water resource department. It is happening for vested political interest. The local people collecting those soil for filling the ponds and changing slope for building construction. For those aforesaid reasons the percolation, runoff are badly influenced. For those reasons people not having ground water throughout the year. To meet the shortfall of water big deep tube wells are installed to meet the immediate shortfall.



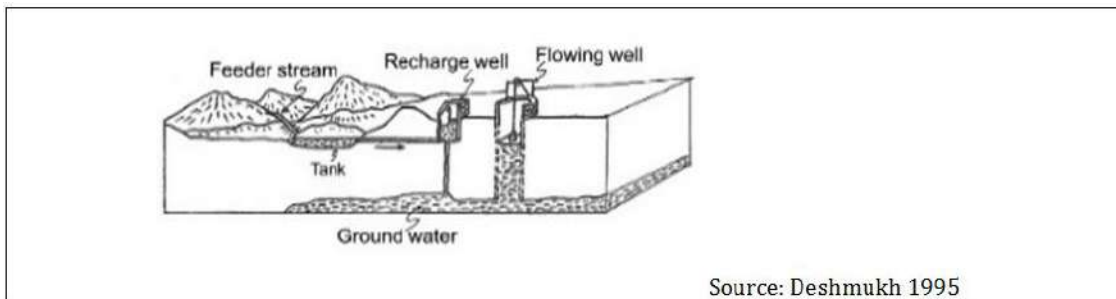
In rural areas of Murshidabad and all over West Bengal, for political interest and Vote, election, many projects are introduced like – agriculture, village road, rural water supply etc. Projects of both by central and state government. Administration order to complete those overnight. More over for immediate orders by State and Central Government administration had no time to assess the water resource availability in the state and/or in districts. For the reason all the projects failed. More over expansion of urban placeless, growth of population made the situation graver. For those reasons infiltration of water and also percolation rate from natural resources reduced. The reasons are manly urban wastes both solid and liquid.



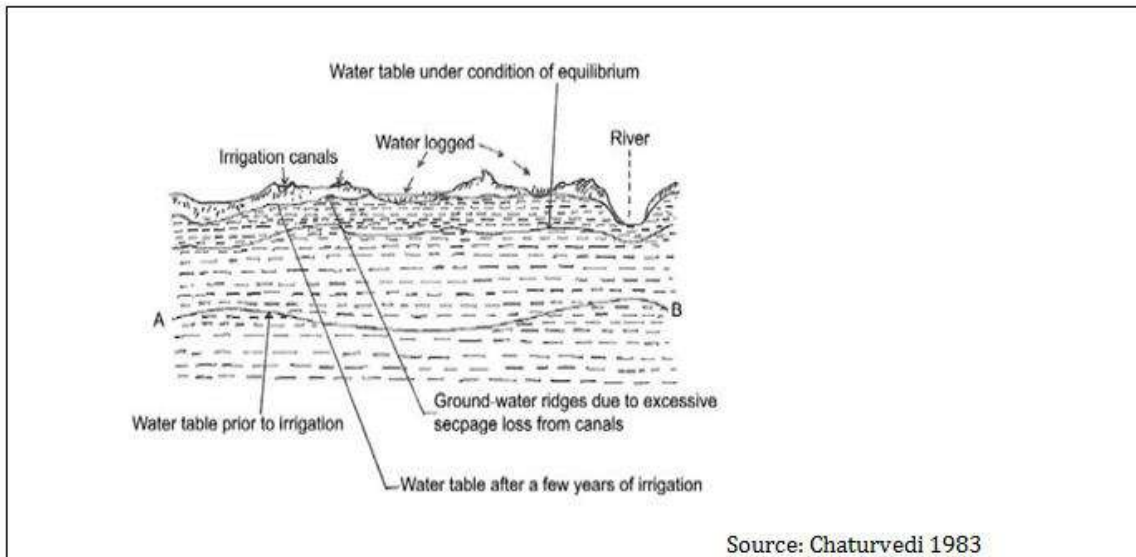
Water supply from feeder streams reduced for un- planned rural settlement, use of plastics, polythene, chemical toxic wastes, construction of roads in towns and villages intercepted the normal runoff of rain water all over Murshidabad. Construction of new railway lines, highways, bridges disturbed the natural run off. Planning of recharge well is a dream now. More over in urban placeless FAR (Floor area regulation) is not maintained. In cases it is deliberately violated by administration, with unhealthy relations with builders, promoters, political leaders, mafias, police --- and all sectors. For those aforesaid reason shortfall of ground water is now very common in Murshidabad.



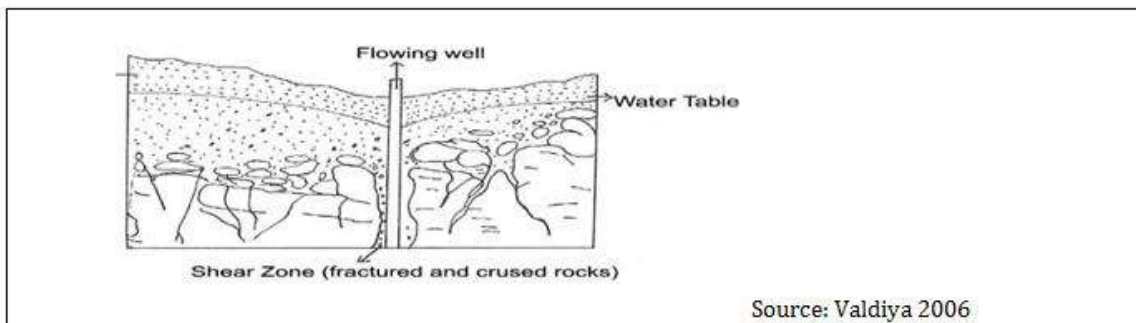
To maintain the normal flow of Vandardaha Bill, during British period, “the department of public works” constructed many sluice gates to feed Vandardaha Bill throughout the year linking with Bhagirathi. Due to strict administration of the government, those sluice gates were operated in a systematic manner. But for some vested interest those sluice gates were closed. This happened in between the year of 1968 - 1972, with an unhealthy understanding among political leaders, police, administration, promoters-- all the sluice gates are gradually closed. The promoters started constructions violating all norm and ethics. Gradually public started suffering on shortfall of ground water. Due to all links from Bhagirathi became closed, the biodiversity and ecology of the total area gradually disturbed. All the linking Bills are gradually become dry due to short fall of flow along Vairab River and its old channels. Thus the planning of improving the ground water storage is only possible if we rejuvenate the flow of Vairab River at Akhriganj. Also opening of sluice gates are most urgent matter to maintain the ground water table of Berhampore town. Those old channels also will be able to maintain the health of Berhampore town.



Due to unsatisfactory planning shortfall of ground water is now a common scenario all over the district of Murshidabad. Watershade planning should be taken up first to improve the water resource management. Many small projects are taken up by the State Government for conservation of rain water, but public awareness is the most important factor on their own interest, Murshidabad is fur behind, Even Kesiari block and West Midnapur. They are more active on ground water conservation, and use ethics. They are trying to maintain water table equilibrium throughout the year.



Source: Chaturvedi 1983



Source: Valdiya 2006

In many places of Murshidabad, River lift planning may be introduced to meet the scarcity of agricultural water supply. As the matter is not much lucrative for the vested groups, for the reason the matter is neglected by administration. In Rajasthan with the help of “Pani Panchayat”, they are successful. Lifting of ground water by deep tube well is injurious habit to meet the immediate shortfall. But recharging is difficult in 3rd world country.

Analysis -

In every town withdrawal of ground water causes depilation of ground water reservoirs. In normal rule the water table will be lowered. Pumping out of ground water create cone of depression around the well. It happens when the rate of inflow is less than quantity of withdrawal. The large number of well and the rate of withdrawal, the greater would be the lowering of the water table. This practice is called overdraft.

At present in Berhampore town the short fall of ground water is a very common feature almost on every ward.

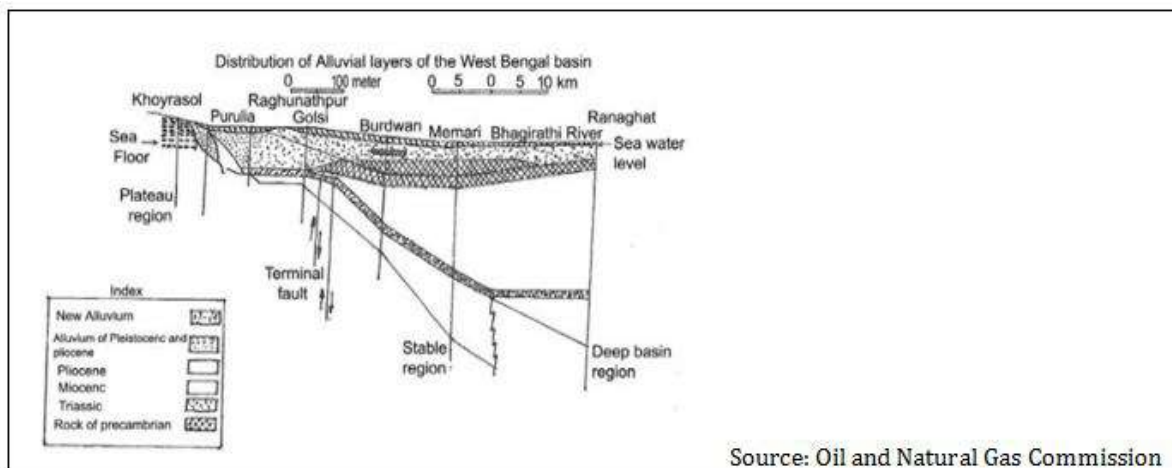
The findings are as follow

Ward Number	Having water throughout the year	Not having water from December to June
	22, 21, 4, 1, 10, 21, 20, 19, 17, 16, 23, 18, 7, 2, 4, 26	21, 20, 19, 17, 16, 23, 18, 15, 14, 8, 6, 5, 3, 1

Nature of water lifting & supply at Berhampore

Dug well	Municipal Supply	Shallow tube well	Deep tube well Private
3%	13%	56%	28%
	6% River lift 8% Deep tube well		

Western part of West Bengal Basin Alluvial Layer:

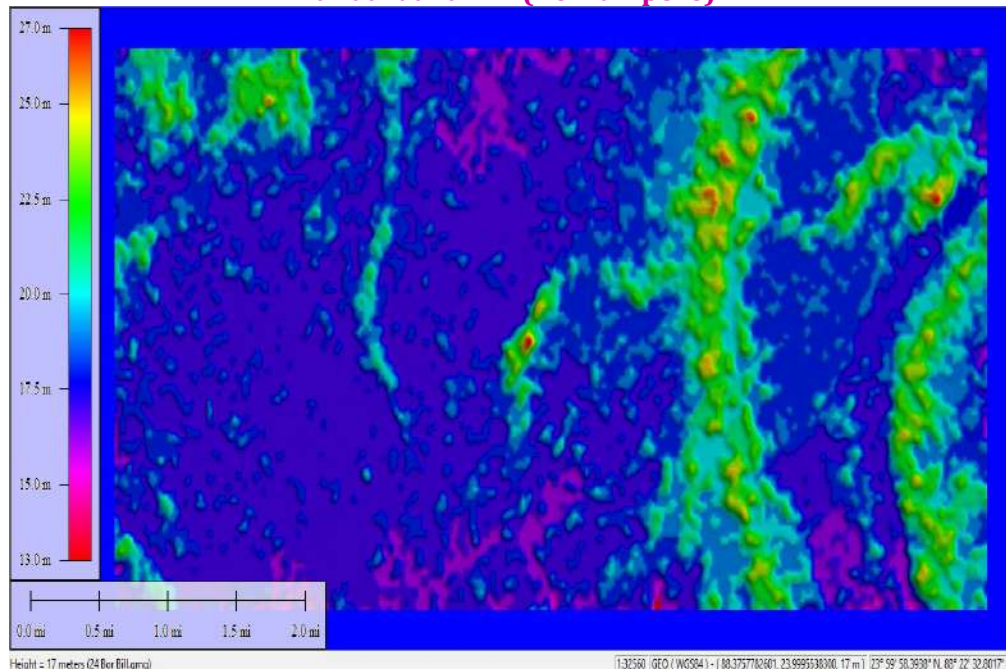


CONCLUSION -

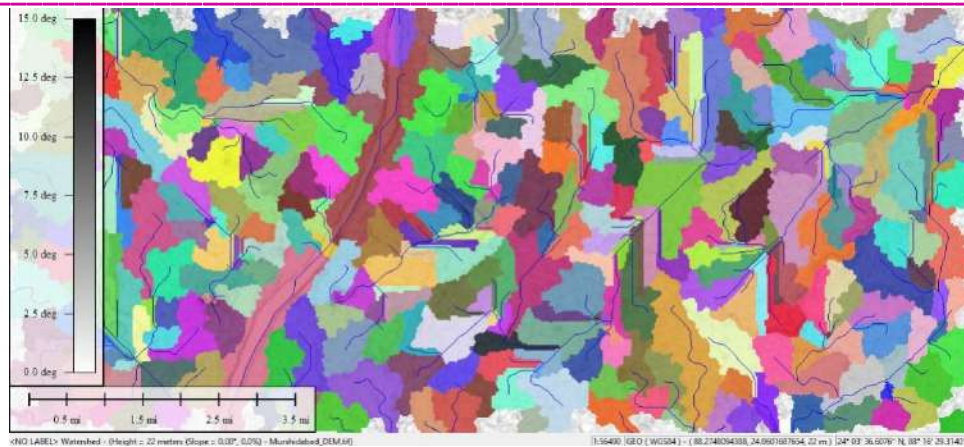
In view of the ground water problem at Berhampore, growth of population concentration at district head quarter is the basic one. As the urban facilities are not adequate in subdivisions and in big villages, people concentrating at Berhampore for health, education, legal help, market, recreations, safe accommodation, business, regional offices of banks, insurance, and for many more facilities. Thus the growth of urbanization concentrating people. The natural demand of water supply increased. In Berhampore the administration is failed to maintain the FAR rules, thus the gaps among the buildings are not adequate. In urban planning some liberties are given to the state government. But liberty turns to rustic administrations, without knowing recklessly municipal rules are framed on the outlook of tax collection and other revenue. Thus the management failed to understand that their revenue earning will be gone for water supply.



Vandardaha Bill (Berhampore)



Vandardaha Bill (Berhampore)
Simulated Image 3 inch Rain fall
Watershade Berhampore 2017



Watershed Generation Options

Watershed Options | Watershed Bounds

Description: DRAINAGE NETWORK

Stream Threshold
Specify how much ground area or how many cells the flow must accumulate from for a cell to be considered part of a stream. Larger values result in only more major water flows being classified as streams.

Stream Cell Count: 300

Stream Drainage Area: 200 Square Kilometers

Discard Stream Starts Less than 25 meters in Length

Operations at Selected Locations (Select with Digitizer Tool)

Trace Flow from Selected Line(s)

Trace Flow from Selected Point(s) (Water Drop Analysis)

Create Watershed Areas Showing Drainage to Selected Line(s)

Create Watershed Areas Showing Drainage to Selected Point(s)

ADVANCED: Flow Threshold in Sample Resolution: 2

Create Watershed Areas Showing Drainage to Streams

Interpolate to Fill Small Gaps in Data

Smooth Streams to Improve Appearance

ADVANCED: Show Flow Accumulation as Grid

Resolution
The resolution affects fidelity with which the watershed is generated. Larger numbers result in a less detailed watershed, but it will generate more quickly. Typically you'll just want to accept the defaults.

X-axis: 0.000277777777777691 arc degrees

Y-axis: 0.000277777777777759 arc degrees

If you wish to change the ground units that the resolution is specified in, you need to change the current projection by going to Config->Projection.

Resampling: Automatically Resample for Resolution

Depression Fill Depth
Specify the maximum depth of depression in the terrain data that will be filled to facilitate creating the flow network.

8 meters

Save DEM to Global Mapper Grid File After Filling Depressions

Keep Ocean Elevations (i.e. 0 meters) at Zero

OK Cancel Apply Help

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