AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International

ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

"ASSESSMENT OF IMPOUNDMENT WATER RESOURCES DEVELOPMENT IN PURBA MEDINIPUR DISTRICT OF WEST BENGAL USING REMOTE SENSING AND GIS TECHNIQUES"

Runu Maity
Research Scholar
Department of Geography, CMJ University, Jorabat, Meghalaya, India.
Dr. Hamidul Hassan
(Assistant Professor)
Research Guide,
Department of Geography, CMJ University, Jorabat, Meghalaya, India.

Abstract

It is challenging to examine groundwater in regions with hard rock. To get around this intricacy, an incorporated methodology in view of state of the art remote detecting and GIS applications is reasonable for assessing groundwater planned zones in light of various models, including occasional land use/cover and vegetation, hydro-geography, geomorphology, soil, waste thickness, and rise and storm and post-rainstorm water levels. The utilization of a likelihood weight age file overlay approach, which utilizes Bayesian insights, empowers a direct mix of the likelihood loads of each subject guide with the singular impact esteem. From that point onward, each topical guide's relating likelihood weight is duplicated by these limit values. The outcome exhibits that Paschim Medinipur's groundwater possibility stretches out along its eastern side and in a couple of disconnected regions in its northern and southern parts. The groundwater potential zone map in view of hydrologic factors likewise showed that 8.08% of the examination area was evaluated as having exceptionally high potential, 11.99% as having high potential, and 17.72% as having moderate potential. In addition, suggested groundwater deliberation systems for every one of the few plausible zones have been made. This exploration likewise offers a strategy for surveying the water assets in hard rock territory, which opens the entryway for future development and the executive's methods.

Keywords: Remote Sensing, GIS, probability weight age index, Groundwater potentiality

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International

ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

1. Introduction

The fundamental objective of this study is to all the more likely comprehending the numerous job prospects accessible to neighborhood asset clients in the Purba Medinipur region, as well as the ongoing area use frameworks. For organizers and chiefs to foster drafting proposals, plan the board plans, decide levels of purpose, and acquaint productive control systems with guarantee maintainability and assurance of the normal assets, they should initially comprehend the elements of the asset use design and the variables that are the drivers of progress.

While it might reestablish itself, groundwater is a characteristic asset that is just somewhat accessible in hard rock landscape. Advancement of water assets is significant in India since it assists with keeping the country's agro-economy stable. In India, practically 30% of the metropolitan populace and over 90% of the rustic populace depend on groundwater for their family and drinking needs, separately. Because of the reception of multi-trimming rehearses and the presentation of high yielding harvest assortments, the two of which need an ideal, solid water supply and the overexploitation of groundwater assets, reliance on groundwater has recently risen.

Because of the deficient inventory of surface water assets, developing populaces and agrarian exercises increment the requirement for groundwater assets as well as dirty them by releasing untreated waste into the ground. As a secret regular asset that is impervious to coordinate perception, groundwater assessment is vital for finding water supply and checking wells as well concerning decreasing groundwater defilement.

Test penetrating and stratigraphic examination are two of the most tedious, costly, and work serious ways of deciding the areas and thickness of springs and other subsurface data. In any case, coordinated examinations that join customary review strategies with satellite picture information, geographic data framework (GIS) devices, and different information sources are helpful for expanding discoveries' exactness as well as limiting any predisposition towards a specific subject. Earlier as of not long ago, numerous researchers utilized the geomorphology and other related qualities to lay out the geological circulation of groundwater potential zones utilizing the remote detecting and GIS approach. To distinguish the future groundwater possible districts, a dependable strategy for assessing dynamic water asset potential is required. The ebb and flow research utilized RS and GIS to recognize groundwater reflection foundation that were commonsense in each of the potential zones in and around the PaschimMedinipur area.

As of now, it is normal to utilize geographic data frameworks (GIS) and remote detecting (RS) to investigate the outer layer of the planet as it changes through existence. A spatial and environmental examination of a location is required for both regional and national planning and management. Water-logged environments have been discovered to arise owing to a variety of

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

natural and artificial sources all around the globe. In rural places, water logging is considered a natural or almost natural danger.

Waterlogging is an environmental issue that affects several countries, including China, Pakistan, Bangladesh, India and others. It is often observed to be built in low-lying locations without significant slope fluctuations. When a region is low-elevated compared to its surroundings, the groundwater level is extremely close to the earth's surface or the surface soil does not transport precipitation to deep earth layers, waterlogging may begin there. The locals are said to be at risk from the seasonal waterlogging environment since it disrupts the surface transportation infrastructure. Remote sensing data may be useful for defining the tiny pockets of wet regions. In India, Choubey (1998) conducted research on the use of remote sensing to identify waterlogged regions in the SriramSagar command area. According to Bhaker (2011), satellite imaging may show the surface manifestation of waterlogged regions.

To plan the locales in danger of waterlogging while at the same time considering fluctuated band proportions of LISS information, a few procedures like the Water Record, Saltiness File, Standardized Differential Saltiness List, Brilliance Record, Vegetation Lists, and Wetness Record are used. With the utilization of the Bend GIS 9.3 program, the Landsat 8 pictures shows a band blend of five, six, and four to obviously recognize land from water (ESRI 2014). To recognize various sorts of land and water, remote detecting and GIS have fostered various methodologies and calculations that consider band changes in different multi-ghostly pictures.

Here, the fundamental objective is to recognize and plan the locales that are submerged utilizing USGS Landsat 8 (2013) pictures and remote detecting and GIS procedures in the PurbaMedinipur region of the Keleghai stream bowl. The connection between the numerous components that add to the improvement of a waterlogged climate will next be inspected. Here, the water-logged locales have been distinguished and planned utilizing the Standardized Contrast Vegetation File (NDVI), Standardized Distinction Water Record (NDWI), and Standardized Contrast Dampness List (NDMI). Ultimately, it is to evaluate the helpfulness of these RS approaches for finding and fathoming waterlogged districts utilizing a measurable procedure.

One of the main regular assets is groundwater and surface water, which are fundamental for the trustworthy and reasonable arrangement of consumable water supply in both metropolitan and country settings. Subsequently, it is fundamental for both human prosperity and the soundness of different oceanic and earthly biological systems. The second-most abundant wellspring of freshwater right now open, groundwater represents around 30% of all suitable freshwater assets around the world. It is assessed that more than 1.5 billion individuals overall depend on groundwater for their drinking water needs. However, the utilization of remote detecting and GIS is growing rapidly in the improvement of hydrology and water assets. Remote detecting offers

ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

information on the outer layer of the planet that is multispectral, multitemporal, and multisensor. Involving remote detecting information for hydrological studies and checking has a few advantages, one of which is its ability to give spatial and fleeting data, which is fundamental for successful examination, expectation, and approval.

Recognizable proof of imminent groundwater zones will be helped by the joining of remote detecting with GIS for the planning of a few topical layers, for example, seepage thickness, geography, land use/land cover, soil type, slant, and mean yearly precipitation with given loads in a geographic space. Thus, the ebb and flow study's primary goal is to distinguish groundwater expected zones in Bhawanpur-I Block involving remote detecting innovation and GIS to plan, utilizing, and overseeing groundwater assets, which incorporate 354 towns. To make productive administration plans for groundwater preservation in the district, a groundwater potential guide may be utilized. The ebb and flow research utilized RS and GIS ways to deal with recognize groundwater reflection structures that may be underlying every one of the potential zones in and around the Bhagwanpur-I block (PurbaMedinipur area).

2. Literature review

Data from the Shuttle Radar Topographic Mission (SRTM) have been used to create a DEM that shows how the research region is distributed at various altitudes. An undulating micro-relief with highs and lows is seen in the region. A maximum elevation of 319 m above mean sea level (msl) is discovered (figure 6). In general, remote sensing methods are cost-effective and time-saving for finding groundwater prosperity zones, and many projects have been carried out in recent years (Shrinivasan, 1978; Saraf et al., 2001; Jaiswal et al., 2003; Sreedevi et al., 2005; Basavarajappa et al., 2014; Bera and Bera, 2014; Lalbiakmawia and Lalruatkima, 2014; Malik, 2014; Manikandan et al., 2014).

Dixon (2005) mapped the groundwater vulnerability of St. Petersburg, USA, using integrated GIS and fuzzy approaches. In order to identify the places in coastal aquifers, dry and semi-arid regions that are appropriate for groundwater recharge, Ghayoumian et al. (2007) suggested a fuzzy and Boolean logic based technique. They created themed maps, categorised them, and then used boolean and fuzzy logic to incorporate them into a GIS. Therefore, the ideal locations for artificial recharging are identified.

It defines functional overlap between inputs, connects a weighting of all processed inputs, and eventually determines an output response (Dixon et al., 2005; Ghayoumian et al., 2007; Kumar et al., 2010; Riad et al., 2011; Rather et al., 2012; Muthukrishnan et al., 2012; Bhowmick et al., 2014). Fuzzy logic is capable of handling situations with partial data sets and may be used to simulate nonlinear functions of any complexity.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

Fuzzy Simulink modeling was utilised by Kumar et al. (2010) to determine the groundwater quality in Tiruchirappalli, India. Their research shown that the fuzzy logic technique is a highly straightforward, helpful, and practical tool for assessing groundwater quality

To distinguish the suitable groundwater Counterfeit Re-energize zone in dry and semi-dry region of the western Nile delta in Egypt, Riad et al. (2011) made topical guides. The use of fuzzy logic has produced more accurate results. Fuzzy and Boolean logic-based studies for identifying locations for groundwater recharge zones were both investigated by Bhowmick et al. in 2014. Various remote sensing techniques with examples of groundwater-related issues.

The major aim in groundwater remote sensing inquiry is to identify certain important surface indicators from observations made on aerial or satellite pictures. After this investigation, we have come to the conclusion that remote sensing is a crucial instrument for controlling groundwater potentials. Compared to the location map, it may provide more precise recommendations for the choice of locations suited for groundwater investigation. The modern integrated systematic method of "satellite sensor- aerial photographicgeophysical- drilling" has been very effective for groundwater exploration. Groundwater management costs, risk, and time are all decreased.

3. Materials and Methods

.1. Study area

The area of PaschimMedinipur in West Bengal, India, which has a complete size of 9081.13 sq km and is situated between scopes 21°46' and 22°57'N and longitudes 86°33' and 87°44'E. The locale has a heat and humidity, and its territory surface is comprised of level alluvial and deltaic fields, lateritic covered regions, and hard rock uplands. The western part of the area has exceptionally unpleasant landscape, while the remainder of the locale has undulating geology with lateritic rock cover. Toward the east and south-east of the area, these undulating fields continuously change into level alluvial and deltaic fields. The dirt has a decent assortment of ordered groupings, including paleustalfs and haplaquents, and is very productive. Occasional varieties in the region's normal temperature range from a high of 43°C to a low of 7°C, with a typical yearly precipitation of 1428 mm.

.2. Data used

The PaschimMedinipur block's ground water potential zone map was made utilizing various information sources.

(I) The Landsat - 5 Topical Mapper (TM) sensors was utilized, which has a superior spatial goal of 30 m, seven phantom groups, a 16-day return to period, and 8-bit quantization. In a

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

descending direction, the photographs were taken at a notional 9:30 am nearby time. In the dry and post-storm seasons, when there are much of the time no mists, the information scenes were all caught in clear environmental conditions (during early April, 20010 and November, 2009).

(ii) The rise information given by the van radar geography mission (SRTM) is one of the most often utilized computerized height model (DEM) information sources. In any case, as most other DEM sources, the SRTM information requires a lot of pre-handling to guarantee that there are no fake relics in the information that would cause issues in resulting examination, like pits, spikes, and fixes of no information. These voids in the SRTM information are filled, in a perfect world with different wellsprings of DEM information, like geological guides.

(iii) The PaschimMedinipur region, West Bengal, India, is displayed on three geological guide sheets (74J, 75N, and 74O), each at a size of 1:50000. At a similar scale, block maps were likewise accumulated. The PaschimMedinipur framework map was made by digitizing these paper maps. The satellite photographs were mathematically rectified utilizing the digitized map, and the data starting from the earliest stage confirmed. The picture to plan enrollment's root mean square mistake was 0.40 and 0.45 pixels, contrasted with 0.11 and 0.15 pixels for picture to picture enlistment.

(iv) To assemble information on the water level in 2009's storm and post-rainstorm seasons, 159 wells in the entire PaschimMedinipur area were reviewed. Well areas were resolved utilizing a compact GPS and were then put on a guide with their directions in the ArcGIS

(v) Climate. As a feature of the distinguishing proof of the ground water expected zone, these areas were used to assess the preparation sets. Table 1 incorporated the information's all's particulars.

3.3. Satellite information and picture handling activity

The second request of polynomial capability and nearest neighbor re - testing approach were utilized to mathematically address the satellite informational collections in the datum WGS84 and projection UTM zone N45 to keep up with the radiometry and otherworldly data in the pictures. The PaschimMedinipur region line was subset to all of the photographs, which were mosaicked. Programming called ERDAS Envision 9.2 was utilized to deal with the pictures.

By haphazardly picking 100 irregular examples of pixels from each created map, from each methodology, at each date, and contrasting their names against classes acquired from reference information, the exactness of water use and water cover classes was assessed tentatively. The discoveries were reported in even structure known as the "mistake network," which Congalton had recently revealed (1991). Clients' and makers' precision might be determined from the

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

numbers in a blunder framework. The client's precision is determined by separating the all out number of sets perceived in a class by the quantity of sets that were appropriately recognized in that class. Blunders of commission are the term used to portray mistakes insets. The maker's not set in stone by separating the absolute number of pixels got from reference information by the quantity of precise pixels in a single class, which considers the error of exclusion. For assessing the exactness of a guide, the Kappa coefficient is frequently used. Thomlinson et al. (1999) laid out a goal of 85% generally speaking exactness with no class falling underneath 70% precision. The USGS suggested a base precision level of 85% for planning land use/cover utilizing Landsat information.

.3. Groundwater potentiality analysis

The record esteem is determined utilizing a weighted overlay examination to pinpoint the ground water expected zone. The choice of a zone from a gathering for potential groundwater improvement depends on various variables, including waste thickness, geomorphology, hydro-topography, ebb and flow land use during dry and wet seasons, plant wellbeing, and rise. The most well known name for this technique is Multi-Measures Assessment. A likelihood weighted file overlay system has been utilized, permitting a direct blend of each topic guide's likelihood loads (W) and individual effect values (IV). Based on weight computations, a renamed map was made. As per suggestions from the World Wellbeing Association (WHO), these loads for ground water potential changed from 1 to 7. Utilizing Bayesian insights, the position of every boundary has been changed into a likelihood weight. Once more utilizing Bayesian measurements, these evaluations are ordered to reflect influence values. For example, the class with the most potential is given the most noteworthy weight, while the class with the least potential is given the least weight.

- **Results and Discussion**

4.1. The relationship between groundwater potentiality and drainage density

One of the crucial factors in determining a watershed's capacity for groundwater is its drainage density. In general, greater ground water potential is associated with lower drainage density and vice versa. Water re-energize into subsurface medium is generally firmly corresponded with the waste number (recurrence), which might address the seepage thickness trait. Each class demonstrates a time span number of waste sections per 2x2 sq. km matrix region, and the seepage network was straightforwardly recovered from geographical guides (1:50,000) for this examination. Likewise, a point layer was delivered in view of weight age esteem utilizing a nearby polynomial addition approach. The seepage map that was delivered has been organized as 0.65 sq. km.

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

Table 1: specific data features

Data type	Characteristics	Year of acquisition	Source
Satellite Data Landsat 5 TM	Path and row - 139/44 and 139/45	25/11/2009 and 18/04/2010	www.landcover.org
Shuttle Radar Topography Mission (SRTM) data	Resolution of 3-arc seconds	2000	http://www.jpl.nasa.gov/
Topographical maps	No. 73N/1 to 16, 73J/9 to 16, 73O/1, 73O/5 in Scale of 1:50000	1972	Survey of India, Kolkata, West Bengal, India
Block Map of PaschimMedinipur	Scale 1:50000	1982	Block Office, PaschimMedinipur, WB, India
Monsoon & post monsoon water level	data 169 wells from different geographic location	2009	Ground Survey
Soil and Geomorphological, hydrogeology data	Scale 1:50000	2002	Geological survey of India

Hence, the research region may be categorized as having a low to moderate drainage density and a moderate to fine drainage texture. The Kansai Waterway on the south and Silai Stream on the north, as well as other khals, administer most of the waste of the review area. Inside the examination district, a few seepage designs including dendritic, sub-dendritic, and spiral are most frequently seen (Figure 2). Enormous streams that went through little valleys left behind a huge amount of drained material that might be recognized as a shallow landform called valley fill. The western and northern parts have very high drainage densities, whereas the southern and eastern parts have moderate to low densities. Courses for ground water re-energize and capacity might be made at certain areas by the spatial plan of streams under primary control. Besides, thickness uncovers data on the sort of springs, the size of the re-energize region, and the stream course of ground water.

4.2. Hydro-geography and its connection to groundwater probability

To fathom the cycles, materials/lithology, structures, and geologic controls relating to groundwater event as well as groundwater possibilities, hydro-geographical guides show huge land units, landforms, and hidden geography. These guides that show possible regions for groundwater examination act as a critical preparation and execution device for groundwater investigation. More youthful alluvium, more established alluvium, fluvio-deltaic silt overlained

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

by optional laterite (twofold profile), fluvio-deltaic dregs overlained by essential laterite (in situ), Stage margine aggregates, and cellar translucent complex are the hydro-land arrangements for the exploration locale (metamorphites). Table 2 records their elements and groundwater potential. More youthful alluvium is situated in the western part of the exploration district and covers practically 49.49% of that area. All through the area, the fluvio-deltaic residue covered by optional laterite covers an all out area of 30.40%. In the northwestern and SSE locales of the exploration region, more established alluvium makes for generally 5.33% of the all out region.

Table 2: The area's geomorphologic units and their groundwater prospects

Geomorphologic units	**Area in sq. km**	**Percent of Cover**	**Groundwater prospect**
Valley fill deposits	992.5782	10.95	Good
Flood plain deposits	2886.475	32.78	Very good to excellent
Deep buried pediments	20098.464	22.13	Very poor
Deep to moderately buried pediment with lateritic capping	1913.871	21.06	Poor
Moderately buried pediment with lateritic capping	834.8254	8.18	Moderate
Pediment	96.52677	1.05	Poor to negligible
Denudational terraces and rocky outcrop	359.7318	3.65	Moderate to good

More established alluvium's shallow, decently endured zones contain unconfined groundwater, though joints, crevices, and breaks that stretch out past the endured zones contain semi-bound groundwater. The endured zone and fluvio-deltic residue, which have optional porosity, are in this manner the essential wellspring of groundwater event, transport, and transmission. Cellar translucent complex makes up 5.07% of the examination region, while fluvio-deltaic residue covered by essential laterite makes up 8.82%. Stage edge aggregates and storm cellar translucent complex were just identified in the northeastern part of the exploration region, representing 0.89% of the entire locale.

.1. Soil attributes and its connection to groundwater probability

While planning groundwater likely zones, data about the dirt is a key part. For instance, coarse-finished soils are frequently porous, while fine-finished soils suggest diminished penetrability. Very porous soil takes into consideration generally speedy entrance, taking into account most of precipitation to arrive at the ground water table. There are sixteen distinct sorts of soil in the

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

PaschimMedinipur region, including coarse loamy typichaplustalfs, coarse loamy typicustifluvents, fine aericochraqualfs, fine loamy aericochraqualfs, fine loamy typicpaleustalfs, fine loamy typicustochreptas, fine vertichaplaquaepts, fine ver (table 2). In light of the dirt's ability to endure penetration, soil rating was given. The dirt fills in as a characteristic channel to eliminate different pollutions from water. Because of the great explicit yield (19-30%) and porosity esteem (33-39%) of the very fine vertichaplaquepts and sandy soil in the area's eastern piece, re-energize from precipitation ought to promptly move from the surface to the zone of immersion (Holt Jr., 1965). In any case, the glasslike rocks of the locale's north-western district had unfortunate porosity and low penetrability attributable to their little grain sizes and immense surface regions, which expanded erosion and brought about somewhat couple of pores that permit water to move through (Donahue et al., 1983). Soil characteristics decide the amount of groundwater re-energize, stockpiling, and outpouring as well as the level of groundwater contamination.

.2. Topography and its connection to groundwater probability

Computerized Height Model (DEM) information has been used by various scholastics for different assignments, including characterizing waste organizations, deciding hydrogeomorphological units, and depicting and ordering scenes. From a north-west to an eastern and southern bearing, level declines. The slant amounts have shown that the rise is low in the southeast and east. The water table spring has an essentially reliable inclination and fills in as the ground water repository. The exploration region has been separated into seven raised regions with 50-m spans and 300-m distances between them. To recognize the possibilities of ground water, lower altitudinal areas got a bigger weighting, while higher altitudinal regions got a lower weighting.

4.3. Land sue/land cover qualities and its connection to groundwater probability

The different land use classes portrayed incorporate waterway, sand, lateritic land, dry decrepit, soggy neglected, blended backwoods, thick woods, corrupted woodland, open timberland, crop land, horticultural neglected, and settlement. Picture understanding through remote detecting information (Landsat5 TM) of dry and wet months was embraced for the distinguishing proof and translation of the land use example of the area. Table 3 records the different land use types, regions, and rates of the all out region.

Table 3: Paschim Medinipur district's soil qualities and the percentage of its land area covered

Type	Area (in sq m)	Percent
Coarse loamy typichaplustalfs	1,007.51	11.11
Fine loamy ultipaleustalfs	1,506.94	16.59

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International
ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

Fine loamy aericochraqualfs	1,613.46	16.67
Fine vertichaplaquaepts	940.03	10.35
Fine loamy typicustifluvents	469.03	5.16
River	1,521.56	16.75
Fine loamy typicpaleustalfs	226.71	2.50
Loamy skeletal lithic ustochreprs	127.24	1.39
Very fine vertichaplaquepts	123.83	1.36

A computation known as a precision assessment investigation was performed to confirm the characterization's rightness. The blunder grids for both of the photos made utilizing the regulated arrangement approach are displayed in Table 3. Table 3 shows that in April 2010, the general characterization precision and kappa measurement were separately 91.00% and 0.80. In November 2009, a comparative circumstance was found, prompting complete order exactness and kappa quantities of 88.00% and 0.73, separately. The sorts of land cover were organized in extraordinary advantage to water penetrability request. An assortment of surface water re-energize processes are the result of different utilization of territory surfaces. The fundamental parts of this component are: exposed rocks, human settlements, and negligible vegetative cover (Su, 2000). For example, uncovered rocks (lateritic land) are many times considered expanding boundaries since they permit water to pass through breaks and cracks into more profound layers.

4.4. Water level qualities

The most supportive data that can be used to plan groundwater advancement programs markers comes from perception wells that are built appropriately and properly to screen the occasional varieties in ground water level. The storm and post-rainstorm water level change information were utilized to assess how much re-energize/release that had entered the spring (Figure 9a and 9b). The water table exists in both unconfined and to some extent restricted spaces. Utilizing a nearby polynomial introduction approach, the review region's dynamic ground water potential was determined. The profundity of the water table changes extraordinarily in this area, from very shallow (1.5 m bgl) to extremely profound (9.2 m bgl). Towards the foundation of the slope, there is a profound water table. More groundwater accessibility is shown by higher well yields than by lower well yields.

5. Conclusion

Groundwater is widely utilized in PaschimMedinipur to meet the demands of the populace. Due to highly unpredictable rainfall and a lack of surface water bodies, groundwater extraction is rising year after year. This cause penetrated and bore wells to evaporate. Data used to portray geomorphological and hydro-geographical characteristics as well as distinguish scene attributes

ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

and vegetation state came from somewhat detected satellite picture information from Landsat 5. Accordingly, the level of the surface and the waste qualities are both given by SRTM information. Well stock information has additionally been accumulated all through the rainstorm and post-storm seasons to more readily comprehend the ground water system. The outline of groundwater expected zones for proper preparation and the executives programs was made conceivable by the joining and examination utilizing GIS of a few topical guides and picture information. The effectiveness of the tube wells' yields in various land covers demonstrated a relationship between the kind of land cover, the strength of the vegetation, and the potential for groundwater. The application of the best management methods for watersheds across the area, as well as limits on the installation of water collecting infrastructure for the use of groundwater resources, are necessary to assist resolve this issue.

References

1. Anderson, J. R., Hardy, E. E., Roach, J. T., &Witmer, R. E. (1976), "A land use and land cover classification system for use with remote sensor data", United States Government Printing Office, Washington, DC: U.S. Geological Survey, No. Professional Paper 964. [Online]
2. Bahuguna, I.M., Nayak, S., Tamilarsan, V. & Moses, J. (2003), "Ground water prospective zones in Basaltic terrain using Remote Sensing". J.Ind Soc. Remote Sensing, 31(2), 107-118.
3. Brabyn, L. (1996), "Landscape Classification using GIS and National Digital Database", The University of Canterbury, New Zealand, Ph.D. dissertation. [online]
4. Campbell, J. B. (2002), "Introduction to remote sensing" (3rd edition), New York, The Guilford Press.
5. Campbell, J.B. (1996), "Introduction to Remote Sensing", 2nd Ed. The Guilford Press, NY, p444 – 479.
6. Congalton, R. G. (1991), "A review of assessing the accuracy of classifications of remotely sensed data", Remote Sensing of Environment, 37(1), 35–46.
7. Darwich, T., Kawlie, M., Faour, G., Masri, T., Haddad, T., Awad, M., BouKheir, R., Shaban, A., Jomaa, I., Abdallah, C.(2003), "Dynamic factors of land degradation in Lebanon", Workshop on: Ecosystem-based assessment of soil degradation to facilitate land user's and land owners' prompt action. Adana, Turkey, 2- 7/6/2003, p66-68.
8. Donahue, R., Miller, R., &Shickluna, J. (1983), "Soils: An Introduction to Soils and Plant Growth", Englewood Cliffs, NJ: Prentice-Hall, Inc.
9. Fetter, C.W. (2001), "Applied Hydrogeology", Prentice Hall Englewood Cliffs, NJ, p598.
10. Gamon, J.A., Field, C.B., Goulden, M.L., Griffin, K.L., Hartley, A.E., Joel, G., Peñuelas, J., Valentini, R. (1995), "Relationships between NDVI, canopy structure, and photosynthesis in three Californian vegetation types", Ecological Applications, 5, 28-41

ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject: Geography

11. Gupta, R.P. (1991), "Remote Sensing Geology", 1 st Ed., Springer-Verlag, New York, p32-33.
12. Holt, C. L. R., Jr. (1965). Geology and Water Resources of Portage County, Wisconsin. [Geologic Survey Water-Supply Paper 1796 and Plate 1] Washington, DC: US Government Printing Office.
13. Hudson, W., &Ramm, C. (1987), "Correct formula of the Kappa coefficient of agreement", Photogrammetric Engineering and Remote Sensing, 53(4), 421–422.
14. Hodgson, G. (1999), "Application of HARSD landscape classification and groundwater surface mapping techniques to study catchment at Ucarro, Western Australia", Task Report GAH99_2, pp. 15. [Online]
15. Jagadeeswara, R.P., Harikrishna, P., &Rao, B.S. (2004), "An integrated study on groundwater resources of PeddaGedda Watershed", J. Indian Soc. Remote Sensing, 32, 307-311.
16. Jensen, J. R. (2004), "Introductory digital image processing – A remote sensing perspective," 3rd ed., Upper Saddle River, NJ, Prentice Hall, p. 544.
17. Kondoh, A., & Higuchi, A. (2001), "Relationship between satellite-derived spectral brightness and evapotranspiration from a grassland", Hydrological Processes, 15, 1761-1770
18. Krishnamurty, J., &Srinivas. (1996), "Demarcation of geological and geomorphological features of parts of DharwarCraton, Karnataka using IRS LISS-II data", Int. J. Remote Sensing, 17, 3271-3288.
19. Landgrebe, D. A. (2003), "Signal theory methods in multispectral remote sensing" Hoboken, NJ, John Wiley & Sons, Inc. p. 508. Leica, Geosystems. (2008), "Leica geosystems geospatial imaging", ERDAS IMAGINE v9.2. Norcross, USA: Leica Geosystems Geospatial Imaging.
20. Myneni, R. B., Hall, F. B., Sellers, P. J., &Marshak, A. L. (1995), "The interpretation of spectral vegetation indices", IEEE Transactions on Geoscience and Remote Sensing, 33(2), 481–486.

Author's Declaration

I as an author of the above research paper/article, hereby, declare that the content of this paper is prepared by me and if any person having copyright issue or patentor anything otherwise related to the content, I shall always be legally responsible for any issue. For the reason of invisibility of my research paper on the website/amendments/updates, I have resubmitted my paper for publication on the same date. If any data or information given by me is not correct, I shall always be legally responsible. With my whole responsibility legally and formally I have intimated the publisher (Publisher) that my paper has been checked by my guide(if any) or expert to make it sure that paper is technically right and there is no unaccepted plagiarism and the entire content is genuinely mine. If any issue arise related to Plagiarism/Guide Name/Educational Qualification/Designation/Address of my university/college/institution/Structure or Formatting/

AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International

ISSN: 2320-3714
Volume 4 Issue 3
December 2021
Impact Factor: 11.9
Subject : Geography

Resubmission / Submission /Copyright / Patent/Submission for any higher degree or Job/ Primary Data/Secondary Data Issues. I will besolely/entirely responsible for any legal issues. I have been informed that the most of the data from the website is invisible or shuffled or vanished from the data base due to some technical fault or hacking and therefore the process of resubmission is there for the scholars/students who finds trouble in getting their paper on the website. At the time of resubmission of my paper I take all the legal and formal responsibilities, If I hide or do not submit the copy of my original documents (Aadhar/Driving License/Any Identity Proof and Photo) in spite of demand from the publisher then my paper may be rejected or removed from the website anytime and may not be consider for verification. I accept the fact that as the content of this paper and the resubmission legal responsibilities and reasons are only mine then the Publisher (Airo International Journal/Airo National Research Journal) is never responsible. I also declare that if publisher finds any complication or error or anything hidden or implemented otherwise, my paper may be removed from the website or the watermark of remark/actuality may be mentioned on my paper. Even if anything is found illegal publisher may also take legal action against me

Runu Maity
Dr. Hamidul Hassan

****