2024

DISTRICT SURVEY REPORT (DRAFT) KARIMGANJ DISTRICT, ASSAM

(ON MINING OF MINOR MINERALS UNDER 'Y' SCHEDULE OF AMMC RULE 2013)

PREPARED:-

Under the provision of paragraph 7(iii) (a) of Appendix-VII of the Notification dtd.15th January 2016 of MoEF & Climate Change, bringing certain amendment in the EIA Notification 2006

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CONTENTS

1. INTRODUCTION:

Karimganj district is one of districts of the Indian state of Assam. Karimganj town is both the administrative headquarters district. It is located in southern Assam. It borders Tripura and the Sylhet Division of Bangladesh in the east and south direction while the other two district like Hailakandi and Cachar in west and north direction. It makes up the Barak Valley alongside Hailakandi and Cachar. Karimganj was previously part of the Sylhet District before the Partition of India. It became a district in 1983.

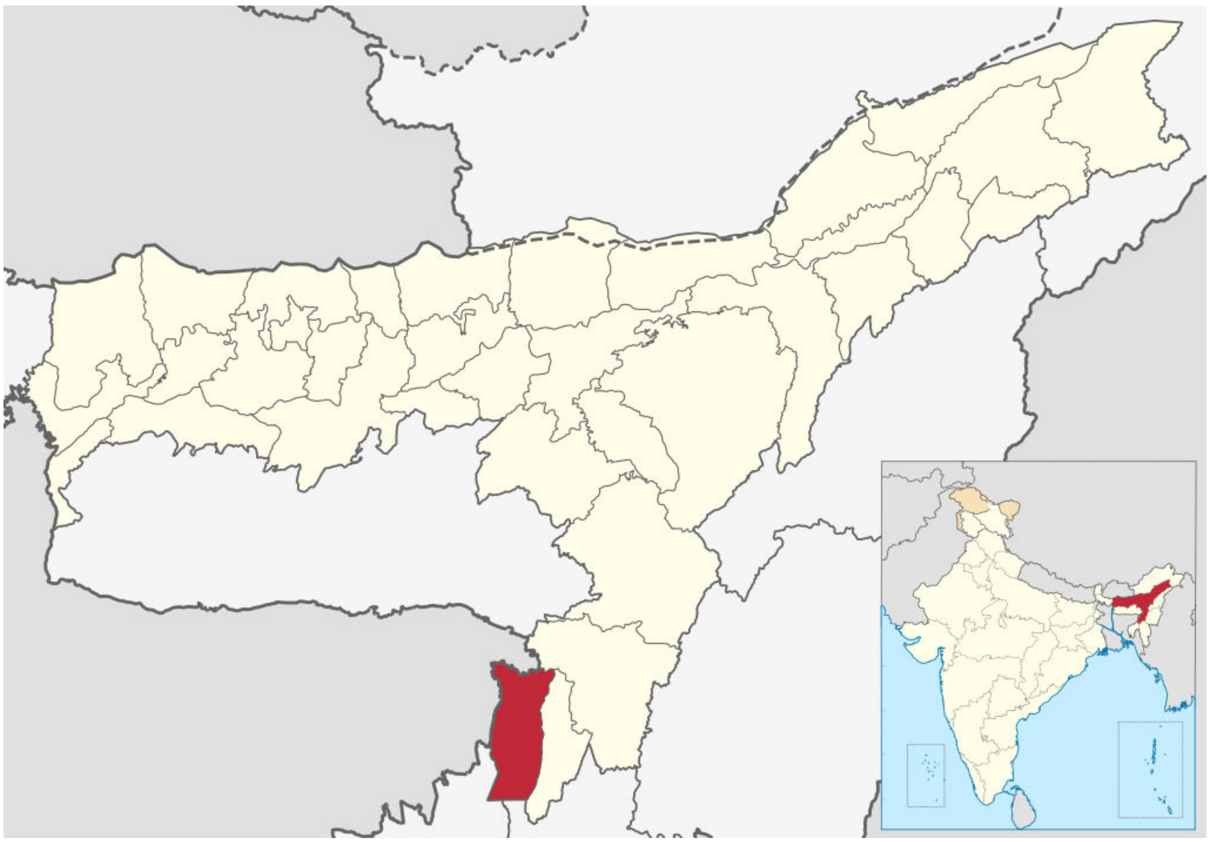

Fig. 1: District map of Assam, red marks show the geographic position of the district Karimganj. Inset: Map of India, red marking shows the state of Assam.

Karimganj district occupies an area of 1,809 square kilometres. Karimganj town is located on the northern fringe of the district adjoining Bangladesh, by the river Kushiyara.Its distance from Guwahati – the largest city of Assam - is approximately 330 km by road and about 350 km by rail. Distances of other important places are :Silchar – 55 km, Shillong – 220 km, Agartala – 250 km. Flanked on two sides by the rivers Kushiyara and Longai, Karimganj town is located just on the Bangladesh border with the river Kushiyara flowing in between. One prominent feature of the place is a long and winding canal called Noti Khal meandering through the town.

Karimganj District has one sub-division. The district has 5 tehsils or development circles (Karimganj, Badarpur, Nilambazar, Patharkandi and Ramkrishna Nagar), two urban areas (karimganj and Patharkandi.The Major are town (Karimganj, Badarpur,Ramkrishna Nagar and Patharkandi), 7 community development blocks (North Karimganj, South Karimganj, Badarpur, Patharkandi, Ramkrishna Nagar, Dullavcherra and Lowairpoa), 7 police stations (Karimganj, Badarpur, Ramkrishna Nagar, Patharkandi, Ratabari, Nilambazar, and Bazarichara), 95 gram panchayats, and seven anchalik panchayats.

Demographics

According to the 2011 census Karimganj district has a population of 1,228,686, roughly equal to the nation of Bahrain or the US state of New Hampshire. This gives it a ranking of 392nd in India (out of a total of 640). The district has a population density of 673 inhabitants per square kilometre (1,740/sq mi) .Its population growth rate over the decade 2001-2011 was 20.74%. Karimganj has a sex ratio of 961 females for every 1000 males, and a literacy rate of 79.72%. 8.93% of the population lives in urban areas. Scheduled Castes and Scheduled Tribes make up 12.85% and 0.16% of the population respectively.

2. General Profile of the district:

2.1 Geography: Together with two other neighbouring districts - Cachar and Hailakandi - it constitutes the barak valley zone in southern Assam. Total area of the district is 1809 sq.kms. Which comprises varied geographical features like agricultural plains, shallow wetlands, hilly terrains and forests. 30% of total geographical area is covered by forest. The geographical location of Karimganj district is between longitudes 92°15' and 92°35' east and latitudes 24°15' and 25°55' north. The district is bounded on the north by Bangladesh and Cachar district; on the south by Mizoram and tripura states, on the west by Bangladesh and tripura and on the east by Hailakandi district. Located strategically, the district shares 92 kms. of international border with the neighbouring country of Bangladesh including both land and water boundary. It can be said that, Karimganj, along with the neighbouring district of Cachar demarcates the frontier between the plains of the padma-meghna basin and the hilly north-east India. Hilly terrains Karimganj district is actually shut in between two hill ranges, whereas there is a third hill that runs through the southern part of the district. The chhatachura range that starts from the south-east border, forms the whole length of border with Hailakandi district. The summit of the range is called the chhatachura peak and its height is 2087 feet above the sea-level. The hills gradually decline in height and in the middle section, which bears the name sarashpur, are only 1000 feet above the sea-level near the barak river. At the lowest level, where they are known as the badarpur hills, the average height is about 500 feet. The adamail or patharia range marks the western border of the district forming the international border with Bangladesh. Running from the south to the north, its length is about 28 miles and breadth about 7 to 8 miles. The highest point of the range is about 800 feet above sea-level. The third hilly range crossing through the district is the duhalia range, also called the pratapgarh range. Besides these main ranges, the plains of the district are also dotted with hillocks and forests. The north and north-eastern portion of the district are mainly plains whereas the south and south-western parts are mainly covered with forest. Rivers and their courses kushiara, longai and shingla are the main rivers flowing through the district. The river barak enters the district through its north-eastern corner near badarpurghat and after traversing a length of seven miles upto a place called haritikar near bhanga, is divided into two branches - namely, the kushiara and the surma. From the point of bifurcation, the kushiara flows westwards to Bangladesh forming the northern boundary of the distict. The longai river originates in the jampai hills of tripura state and travelling a course of northerly direction, turns south-west near longai railway station near Karimganj town. Near latu village, it enters Bangladesh. The singla river originates from Mizoram state and taking a northward direction, it falls in sonbill haor wherefrom the stream emerges bifurcated forming two rivulets - kachua and kakra. The kushiara and the longai are perennial rivers, whereas the others dry up during the winter.

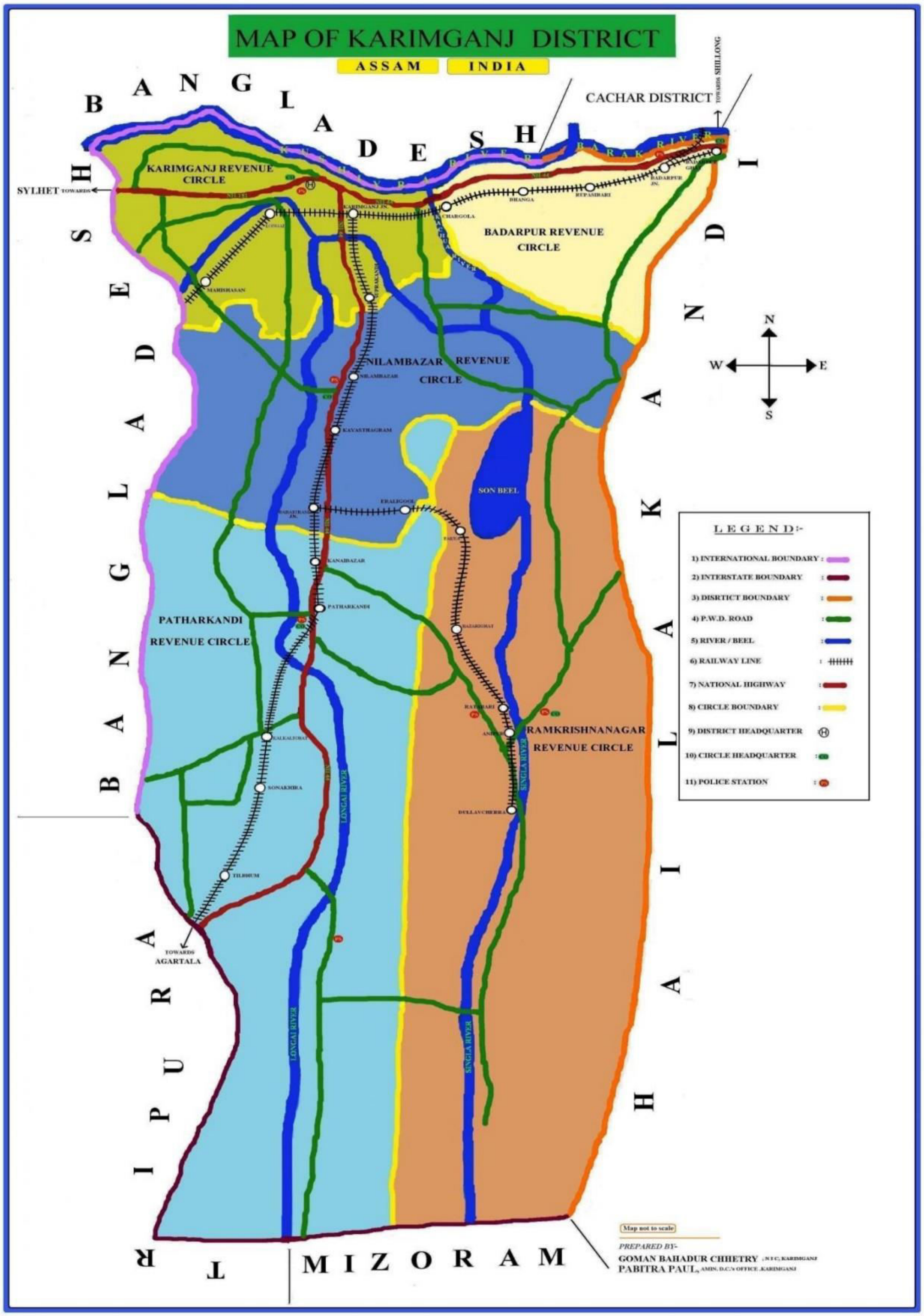

Fig 2: Administrative map of district Karimganj (Source: https://karimganj.assam.gov.in/about-us/district-maps)

2.2 Climate:

2.3 Topography: Karimganj town is located at 24°52′N 92°21′E / 24.87°N 92.35°E / 24.87; 92.35. The area of Karimganj Town is 16.09 km2. It has an average elevation of 13 metres (42 feet). The maximum elevation is 2087 ft. whereas the minimum elevation is 23 ft. It is marked by a distinctive topographical landscape that blends expansive alluvial plains with rugged hilly terrain and an intricate network of waterways

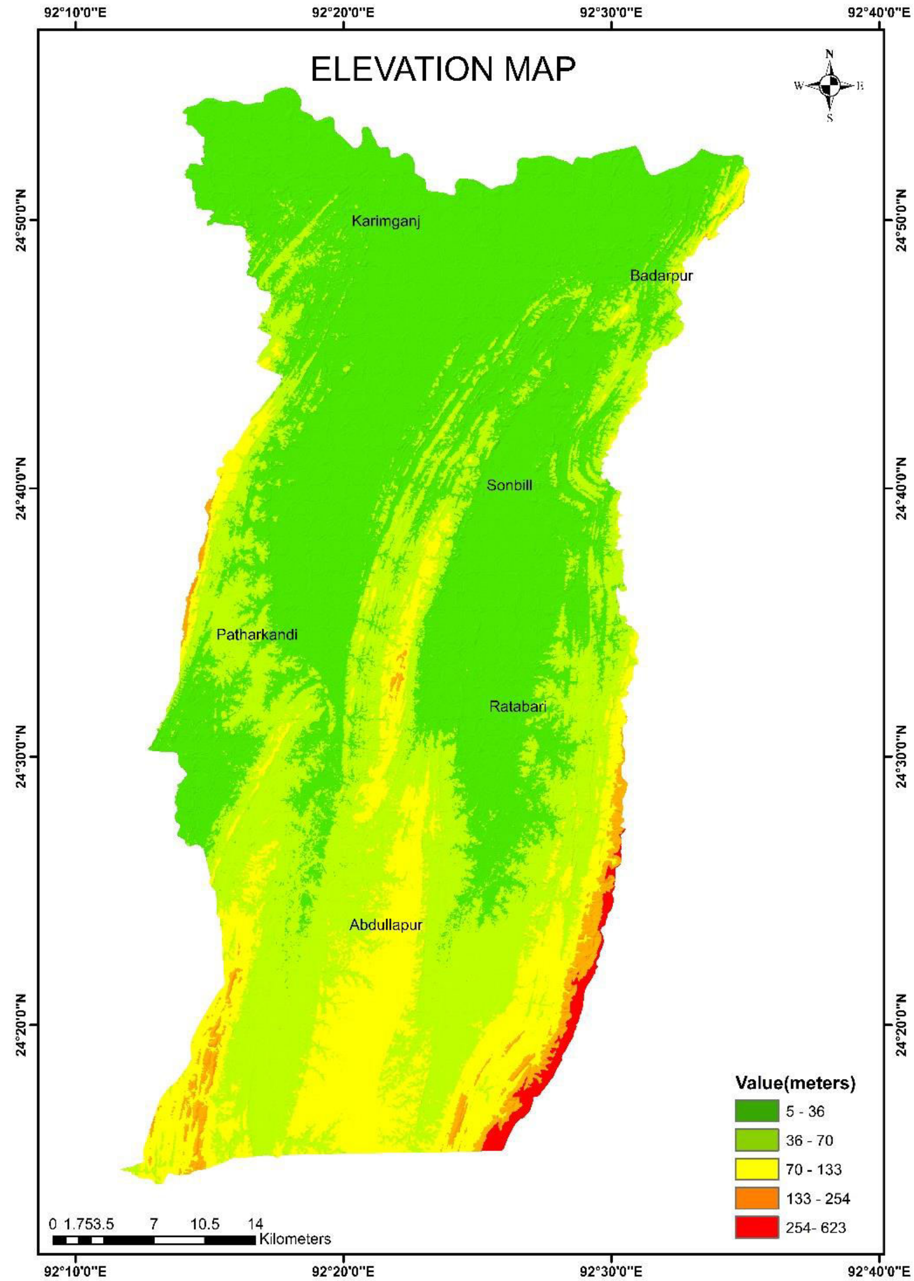

Fig: Elevation map of district Karimganj.

2.4 Ground Water: The occurrence and movement of groundwater is influenced by lithology,structure, geomorphology and drainage pattern of aparticular area while replenishment or recharge is further affected by land-use,precipitation and infiltration rate. The Karimganj district is located in the southern fringe of Assam and is one of the three main districts of Barak Valley. The main groundwater recharge sources of this district is Precipitation (Rain). Other sources for major aquifer rechargesare –river discharge to aquifer, seepage from rivers and ponds while, the major aquifer discharge include Evapotranspiration, groundwaterwithdrawal for domestic use, aquifer infiltration tothe river.

To study the groundwater regime of the area, groundwater water levels are measured seasonally in terms of Depth below ground level , mostly from monitoring stations under NHNS (National Hydrograph Network stations).The depth of water level in Pre-monsoon season varies from 0.2 m bgl to 6.2m bgl, with the deepest level reported from the area in and around Karimganj town whicle the depth to water level is very shallow in the central part of the valley. On the other hand, in the Post-monsoon Season, the depth to water level in the study area ranges between0.0m bgl to 4.4m bgl with the deepest level measured from the karimganj town area, but it is very shallow in the cental part of the valley (MITRA et al.,2022). As the pre-monsoon water level is less than 2m in most of the western and southwestern part of the district, these areas are either waterlogged or prone to waterlogging. Due to the clayey nature of the alluvial cover, it prevents the water to percolate downward. The rising trend in groundwater level during monsoon may be due to over recharging of the system due to heavy rainfall andlower extent of groundwater withdrawal after the monsoon period.The nature of ground water in both the seasons fall in the safe limit of pH standard (6-8.5) for domestic and irrigation purposes. Regionally the ground water flow direction is from the hills of the Southern side towards the valley portion which ultimatelyflowstowards the Barak River, flowing along the Northern flank of the district.

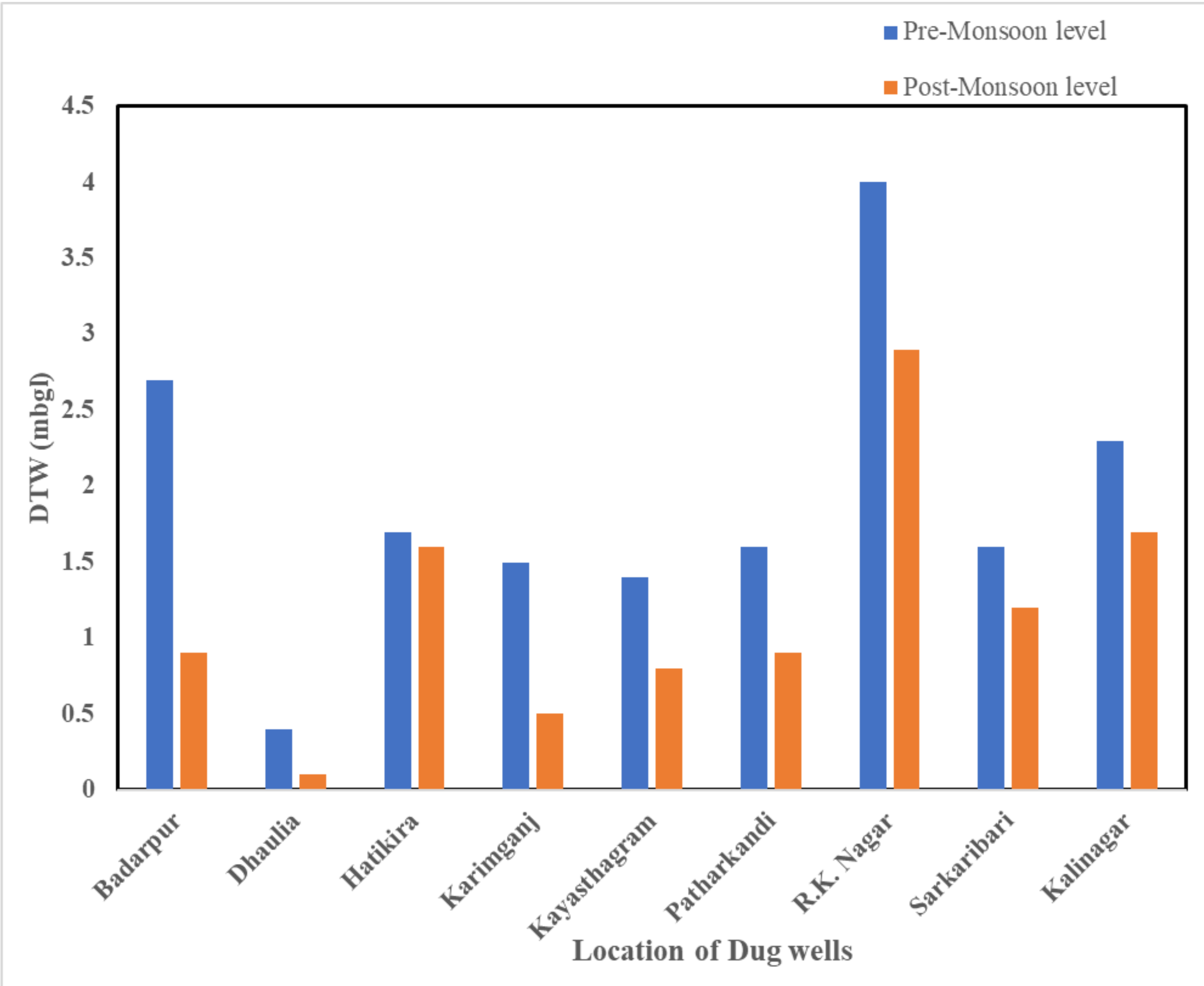

Figure:-DTW Levels during Pre-monsoon and Post-monsoon Season of different Locations of Karimganj District (Data Source-MITRA et al.,2022).

The Karimganj Districtis surrounded by hills on both eastern and western parts as well as in the central part, which give rise to two narrow synclinal valleys - Karimganj valley and Anipur valley in the central part, which opens up towards the Barak river in the northern side of the district. The main water-bearing formations of the district consists of alluvial formations of Quaternary age, occurring along the banks of main rivers like Kushiyara, Longai etc., Clayey and silty Dupitilaformation , exposed along the valley flanks in the western and southern parts of the district and sandstones of Tipam formation, which forms the principal aquifer of the region , exposed mainly along the foothill areas. Though, the groundwater in alluvial areas have high content of clay and sandy clay so they cannot generate significant amount of water. The Dupitilla formation mainly contains silt and clay with few intercalations of ferruginous sandstone, having low permeability wile, the permeability of Tipam sandstone is very high as it is composed of sub-rounded, fine to medium grained, friable sandstone with intercalated clay and is often explored by deep tube wells. The groundwater occurs under unconfined conditions in alluvial formations while it occurs under semi-confined to confined conditions in the deep aquifers of Dupitila and Tipam formations.

Ground Water Quality

The main groundwater issues in the study area are areas vulnerable to water logging along with high concentration of Iron and Arsenic concentration in ground water above the WHO permissible limit in some areas. From the quality point of view, ground water attains its suitability for drinking as well as irrigation purposes having a pH within the safe limit (6-8.5).However, it is observed that the magnitude of arsenic contamination in groundwater exceed the limit prescribed by WHO i.e,10 μg/L in some parts of the district, which are tapped only from shallow aquifer within 50 m depth.As Contamination is confined to shallow aquifers (<50 m depth), sit is suggested to dig up deeper tubewells (>100 m) in order to access arsenic-free water. Residents who are exposed to arsenic-contaminated water, can develop various health risks. Alternative sources, such as surface water (rivers, lakes, ponds), should be utilized for drinking purposes after suitable treatment and filtering. The groundwater in this district also contain high Iron content (i.e., > 1mg/L), which is above the permissible limit set by WHO fordrinking water. The enrichment of iron in groundwater is due to the ferruginous nature of Tipam sandstone, which forms the principal aquifers of the district. Its highiron content impairs the colour and taste of groundwaterand renders groundwater unsuitable for drinking purpose.

Ground water development

As per ground water resource estimation 2020, the stage of ground water extraction is just 2.51%. Irrigation projects in this district utilizes groundwater only about 2% which shows that the groundwater utilization for irrigation is negligible in the district as most of them are dependent on the surface water resources. Water supply to urban areas is mainy from surface water resources through piped water.. Under PMKSY scheme shallow tube wells(<100m depth) can be constructed in the district . Dug wells and handpumps are used to develop groundwater extraction from the alluvial formations of the district.Deep tube wells (upto 200m depth) are recommended for these areas to access more productive aquifer zones.

Water logging

The district is represented by depressions in its western and southwestern parts which remain water logged for most part of the year. As per the pre monsoon water level data around 513.39 Km^2 of the district has depth to water level less than 2m. As a result, this portion of the district remains water logged. Around 400 km^2 of this district is prone to water-logging condition (MITRA et al.,2022). Mostly, High rainfall during monsoon and low stage of ground water development after monsoon, give rise to frequent water logging in the area.Because of clayey nature of the superficial layers and seepages from the surrounding hills, the surface sustains the water and prevents percolation to underground aquifers.The frequent flood in the district spoils the quality of soil resulting water logging. Presently, this problem of water logging in the district creates hazards for irrigation of land during cultivation.

Water borne diseases

A significant population in rural areas of Karimganj district lacks access to potable water, particularly during lean seasons. This affects numerous villages, leaving residents vulnerable to water-borne diseases. It is because during lean seasons, surface water sources dry up or become contaminated while, Groundwater levels drop, rendering wells and tube wells ineffective.The scarcity of safe drinking water results in increased incidence of water-borne diseases, such as diarrhea, cholera, and typhoid fever and elevated risk of vector-borne diseases, like malaria and dengue fever.

Ground Water Management Strategy

Ground water resource is mainly utilized for drinking purposes. It has little industrial use as there is no major industry in the district. Dug well of 10 to 15 m depth and shallow tube well (STW) can be constructed along the fringe area of the district.Deep tube well of 200 m depth or more can be constructed which is expected to provide a discharge of $50m^3$/hr(MITRA et al.,2022). The aquifer zones should be selected properly with the help of electrical logging device. Optimum use of the tube well should be ascertained to avoid probable hazards. As this region experience high rainfall , it makes rainwater harvesting an ideal solution to augment groundwater resources. Proper planning of available ground water resource, available surface water and rain water harvesting may lead to overall development of the district with respect to water management.

2.4 Drainage System:

The main rivers that govern the Drainage System of Karimganj are the tributaries of Barak River like Kushiara, Longai and Singla rivers, which forms a part of Surma-Meghna River system. All of them are perennial rivers. The Barak River after originating near North Manipur Hills close to Nagaland Border, enters the Karimganjdistict through its north-eastern boundary near Badarpur Ghat. It travels for a length of 11kms upto a place called Haritikar near Bhanga where it bifurcates into two branches- the northern branch is called Surma river as it enters the plains of Bangladesh and its southern branch is called Kushiyara River which also forms the northern boundary of this district then flows westwards and join with Surma and other streams to form Meghna River in Bangladesh. The origin point of Kushiyara river at the mouth of Barak is known as Amlshid Bifurcation point and forms the international boundary between Assam, India and Sylhet town of Bangladesh .Overall, the total length of Barak has a total length of 160 km.
The longai river and Singla river are the two important tributaries of Barak that flows through the Karimganj district. All the rivers drain the major valley in the area. This region is mainly formed by successive deposition of alluvial sediments brought down by all the rivers flowing through it. The longai river has its source from the Jampai hills of Tripura and flows through some part of Mizoram and then enters the alluvial plains of Karimganj district. It travelled in the northerly direction for a few kms and then turns south-west near Longai Railway station near the Karimganj town of this district and finally enters the plains of Bangladesh near Latu village. The singla river originated in the Mizoram hills and enters the karimganj district where it takes a northward turn and enters the Son Beel, freshwater lake in Karimganj district and it is the second largest wetland of Asia. The inlet and outlets of Son Beel is Singla river, where it bifurcates into two small riverlets namely, the Kachua and Kakra. The depth of son beel is less and due to which , it tends to overflow during the rainy season and the water meets the Kushiara river and flows to Bangladesh. Among them ,thekushiara and longai rivers are perennial ones, while the others get dried up during the Rainy season. The overall drainage pattern of Karimganj district is sub-parallel to parallel and dendritic. There are some small ponds in this area which is mainly utilized for fishing purposes and for domestic use.

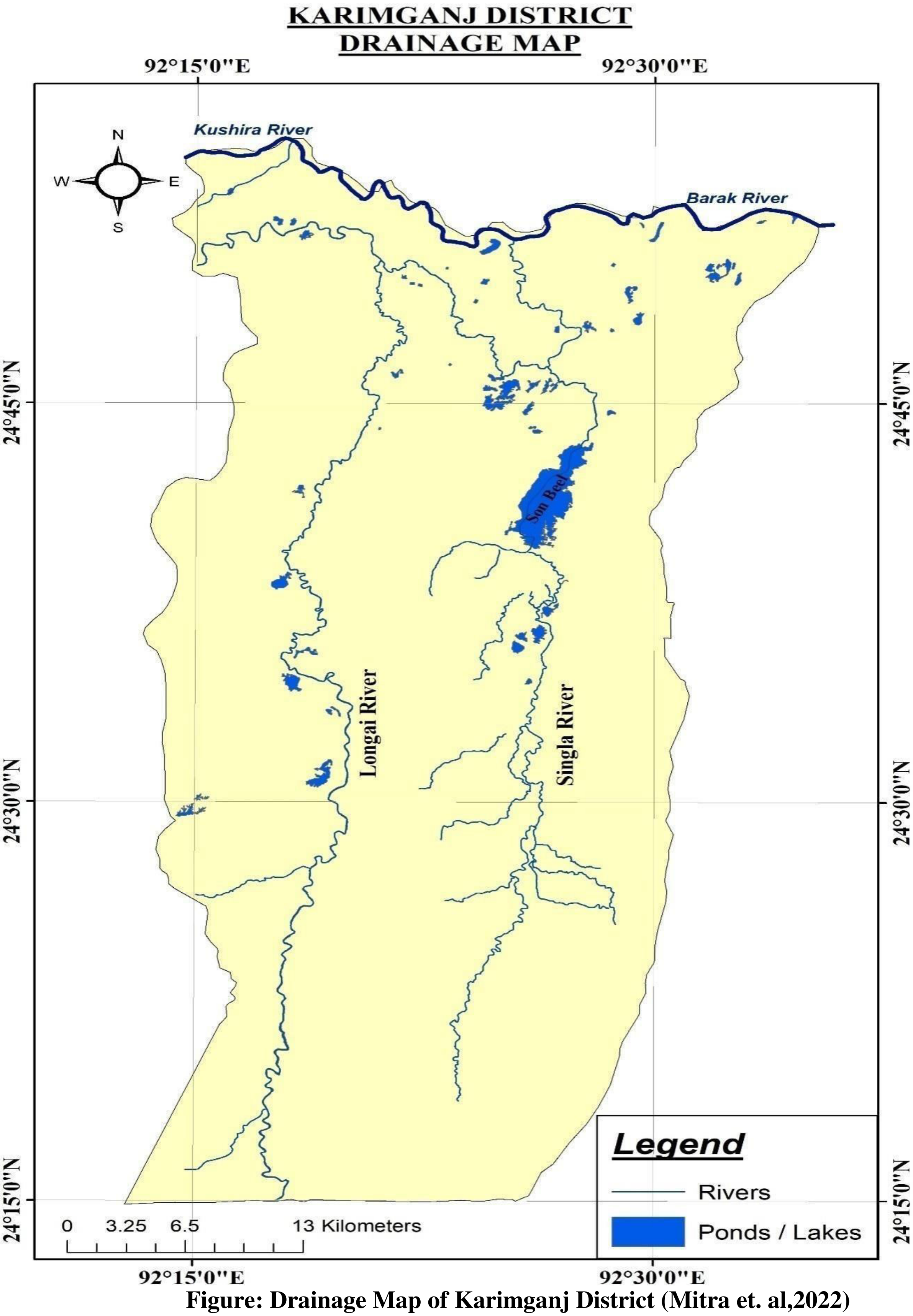

Figure: Drainage Map of Karimganj District (Mitra et. al,2022)

The river system in this region is characterized by numerous rain-fed water courses that drain the valley in this area. The surrounding mountains bordering the valley are subject to excessive precipitation. There are numerous low-lying areas in the valley which are found near the river. The major factors that are responsible singly or in combination causes flood in the valley are large-scale encroachment in the riverine region, high frequency of precipitation, insufficient drainage system, depletion in the natural reservoirs, wide-ranging construction activities without sufficient planning and deforestation in the catchment areas. During Monsoon season, river channels overflow their banks due to inadequate channel capacity, exacerbated by riverbed aggradation and overflooding by massive flows from tributaries thereby giving rise to frequent floods in the area. Poor drainage infrastructure like blockage of natural drainage caused by the railway and road embankments and additional infrastructural aspects, further worsens the situation, leaving the numerous depressions in this area waterlogged for most part of the year. Numerous depressional areas (which is called haors) are formed within the flood-plain which accumulate large stretch of water during the monsoon season but dry out to form the group of ponds (which is called beels) during the dry season.

2.6: Seismicity: Karimganj is situated in a seismically active zone due to the tectonic activity along the boundary of the Indian Plate and the Eurasian Plate. This tectonic activity is a key factor in the geological history of the region, influencing both the landscape and seismic activity in the area. Earthquakes and related geological phenomena have played a role in shaping the region’s topography and sedimentary patterns.The entire Barak Valley including the district Karimganj lies in the seismic zone 5. There was not a record of large earthquake in the district in recent past but on an average the district encounters 5 earthquakes per year.

2.7 Soil

Soil is primarily characterized by its rich and fertile alluvial soils, which dominate the landscape due to the extensive sedimentation from the Barak River and its tributaries. These alluvial soils are typically deep, well-drained, and nutrient-rich, benefiting from regular deposits of silt, clay, and sand carried by the river during seasonal flooding. This deposition enriches the soil with essential minerals and organic matter, making it highly suitable for agriculture. As a result, the district supports a variety of crops, including rice, tea, and various fruits and vegetables, which thrive in these fertile conditions. In contrast, the soils in the hilly regions to the north and south, such as the Khasi-Jaintia and Mizo Hills, are generally less fertile. These hilly soils are often shallow and stony, with lower organic content and higher rates of erosion. They are less suited for intensive agriculture and are typically covered by forest or grassland vegetation. Overall, the contrasting soil types between the alluvial plains and hilly areas significantly influence the district's agricultural practices and land use.

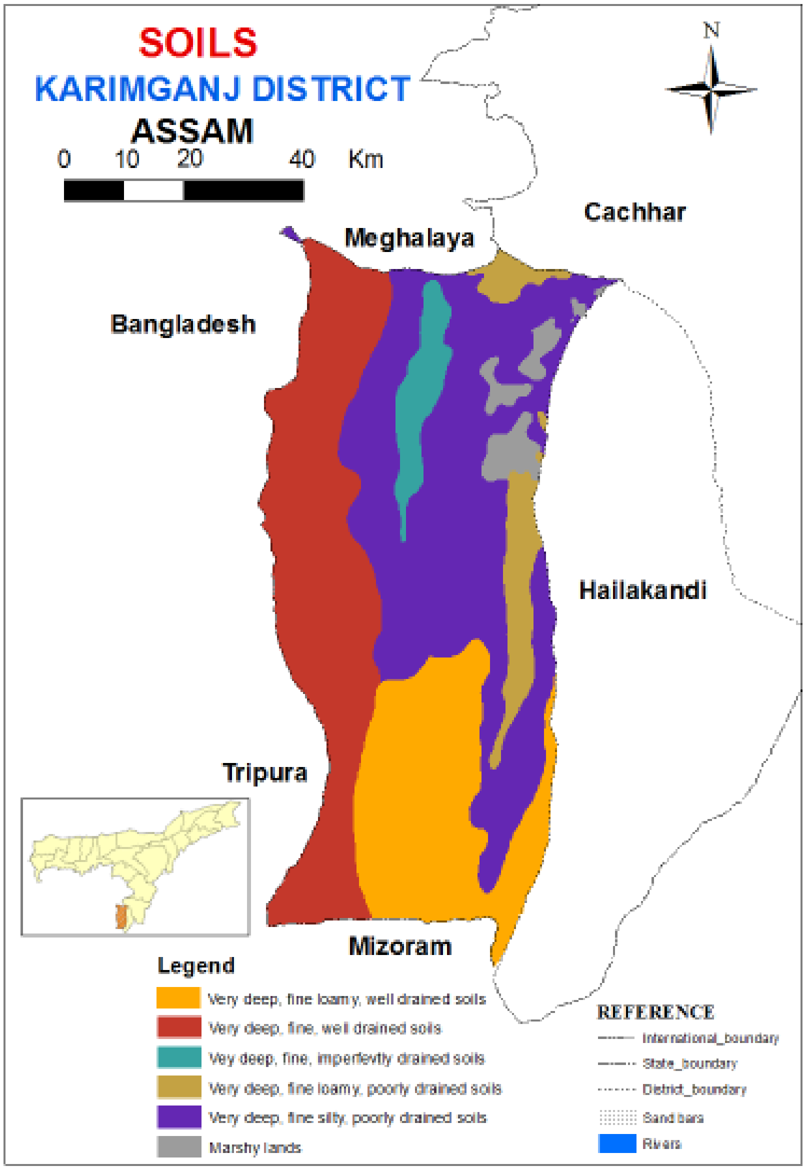

Fig: Soil Map of the district Karimganj.

2.8 Geomorphology: The area can be divided into three parts (source: CGWB):

a. Highly dissected hill range - The general trend of the anticlinal hill range is NE-SW and occasionally varies to N-S. The height of the hill ranges decreases from south to north. The highest elevation is 636m above MSL at Chhatachura in the south eastern part, along the border with Hailakandi district. The lowest part of the hills in north is known as the Badarpur hills with average height of about 150 m. The Chhatachura range is about 80 km from north to south and at some parts 20 km in breadth. The Adamil or Patharia range marks the western border of the Karimganj district forming the international border with Bangladesh. This hill range trends N – S. Its length is about 45 km and breadth is about 13 km. The highest point of the range is about 244 m above mean sea level. The third hilly range present in the study area is the Duhalia range, also called the Pratapgarh range. This hill range also trends N – S. The highest peak of this range about 457 m above mean sea level.

b. Pediment- pediplain complex – A broad, gently sloping expanse of rock debris extending outwards from the foot of a dissected hill slope is found. This zone is found significantly in the western and eastern sides between the dissected hills and alluvial plains.

c. Alluvial Plain- The alluvial plain is found over the synclinal flat bottom valleys. This broad synclinal valley occurs in the study area is the Karimganj valley and Anipur valley. The average elevation of the Karimganj valley is 15m above MSL. The valley becomes narrow and constricted towards the south and widens towards the north. The master slope of the valley is towards north. Some isolated hillocks are present in the plains of the study area. In the alluvial plains, the flood plains of river Longai, Singla Kusiara and Barak is present

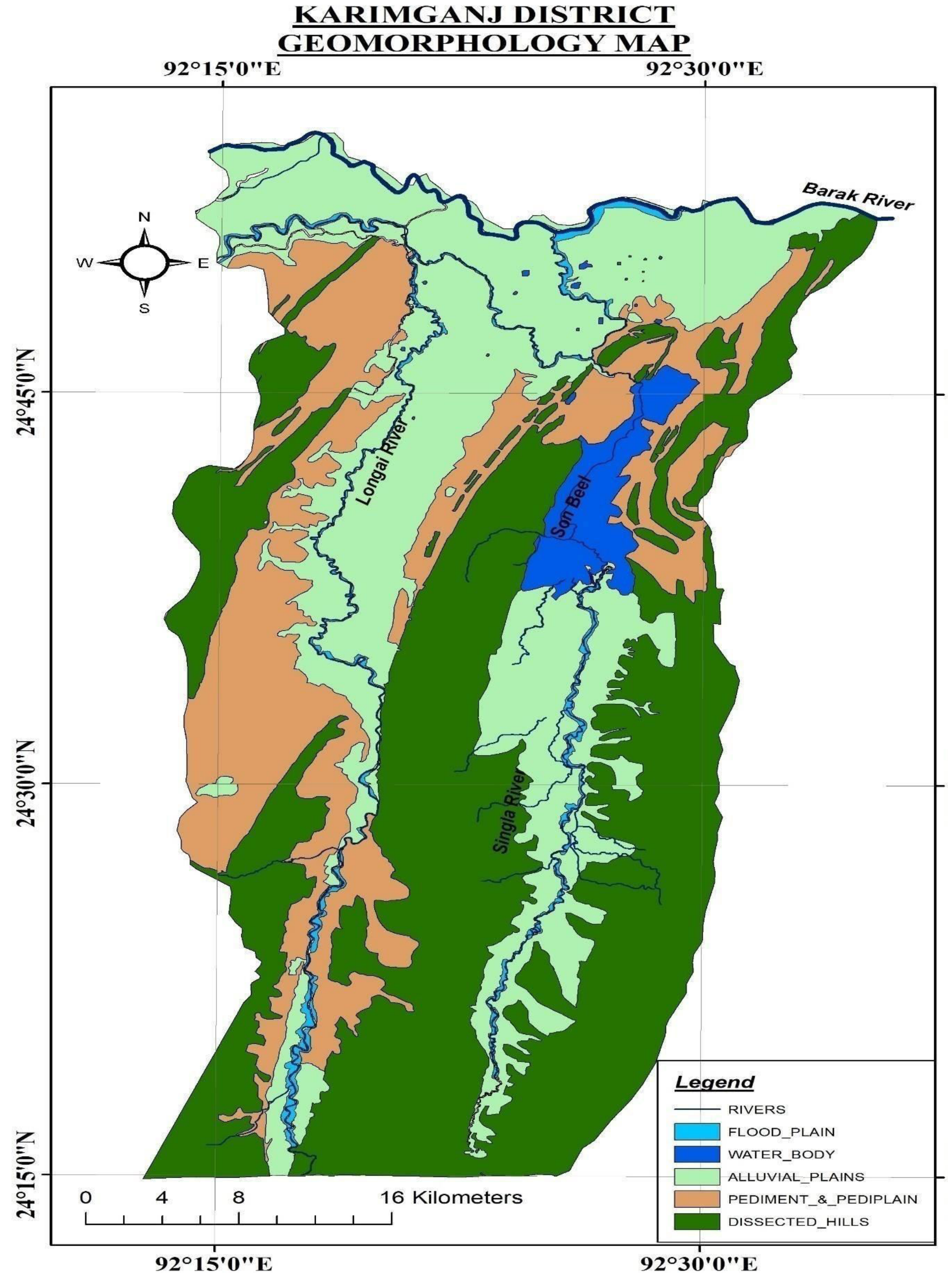

Fig: Geomorphology of the district Karimganj (source : CGWB)

2.9. Physiography:

2.9 Land use Pattern: The entire district is having cultivated area, non-agricultural land, forest land and barren land. The use pattern is shown in the following table (Source: CGWB):

Table: Land use pattern for the district Karimganj

Name of Block	Badarpur	North Karimganj	South Karimganj	Patharkandi	Lowaipowa	R.K. Nagar	Dullabcherra
Geographical area	13506	14565	22041	35031	30922	32675	32160
Cultivable area	8402	9104	12079	16868	14992	15836	15925
Cultivated area	6774	7564	9422	10778	11550	11550	11911
Cultivable waste	525	438	1580	1660	1800	375	416
Current fallow	103	102	153	130	142	111	298
Forest	20	12	2510	607	39	1940	4012
Pasture	20	12	40	120	25	40	218
Land in non-Agricultural use	533	620	2133	520	775	550	1786
Misc. Plantation	1176	1212	1020	300	156	322	130
Barren (Waste Land)	-	264	422	50	20	93	1235

2.10 REGIONAL GEOLOGY OF BARAK VALLEY:

The Paleogene and Neogene sediments from the Barail, Surma, Tipam, and Dupitila group of rocks, as well as more recent deposits, lithologically define the Barak Valley as a portion of the Cenozoic fold belt (Table 1). A sequence of alternating elongated anticlines and synclines with N-S or NNE-SSW axes are formed by the folding of the Paleogene-Neogene sediments into open folds. Folds gradually expand up towards the west. The Paleogene and Neogene sediments in the valley are covered in a relatively thin layer of Quaternary sediments.TheJenam and Renji Formations are representatives of the mostly arenaceous Barail Group of rocks.The Surma Group of rocks, which are situated unevenly above the Barail Group of rocks, are separated into the Bokabil and Bhuban Formations. The lower horizon arenaceous sands known as the Tipam Sandstone Formation, with a small Girujan Clay Formation, predominate, and constitute the majority of the Tipam Group in the research region. The Dupitila Formation represents the Dupitila Group, which is located unconformably over the Girujan Clay of the Surma Group. The region's undifferentiated Quaternary sediments of terrace bed and alluvium, as well as the Baskandi-Udarband and Barpeta-I Formation, make up the Quaternary deposit.

The region is essentially a part of Barak Valley, which is located in the southern region of Assam and is characterised by its mountainous and alluvial environment. The Barail Hill Range and Meghalaya Plateau border the region on the north; the Manipur hills border the area on the east; the Sylhet Division, Bangladesh, low-lying areas and hillocks border the region on the west; and the longitudinal hills of Mizoram border the region on the south. The Barak River separates the low ridges that trend NE-SW to the south from the high Barail Ranges that go E-W to the north. The plains of Bangladesh mix with the valleys, which generally have a southwest slope. The region is characterised by low, longitudinal hills and ridges that run northeastern to southwest, broken up by low, broad valleys. The region has first-order topography, with younger rocks occupying the valleys and older rocks occupying the highest points of anticlines. There is structural control over the valleys and ridges.Together, the first, second, and third order streams in the Barak Valley display a range of drainage patterns, including trellis, parallel, and sub-parallel.

Table 1. Generalized stratigraphy of the area (*After Lemdur et al., 2020*)

Age	Group	Formation	Lithology
	Quaternary undifferentiated	-	Undifferentiated fluvial sediments, sand silt and clay
Holocene	Newer Alluvium	Baskandi-Udarband	Sand, silt and clay
		Barpeta-I	Moderately compact sand silt and silty clay
----------------------------unconformity----------------------------			
Pliocene-Pleistocene	Dihing Group	Gandhigram	Conglomerate, grit, sandstone and clay beds
Mio-Pliocene	Dupitila Group	Dupitila	Soft friable ferruginous sandstone, mottled clays, block of lateritic conglomerate with pockets and layers of pebble beds.
----------------------------unconformity----------------------------			
Mio-Pliocene	Tipam Group	Girujan Clay	Mottled clays, sandy shale and subordinate mottled, coarse to gritty sandstone
		Tipam	Friable, grey and brown, micaceous, gritty sandstones with greyish clay laminations
Miocene	Surma Group	Bokabil	Dark grey shale, siltstones and mudstones with interbands of sandstones and rhythmites.
		Bhuban	Dirty, greenish, grey, micaceous feldspathic sandstones, grey sandyshales, splintery shales andconglomerates
----------------------------unconformity----------------------------			
Eocene-Oligocene	Barail Group	Renji	Thick bedded, bluish grey, hard sandstones, secondary/micaceoussiltstones and thin intercalationsof shales. Coal streaks presentin sandstones.
		Jenam	Grey shales with coal streak, Splintery shales, mud-sand alternations, siltstones and sandstone interbands

Geological description of Barak Valley:

The geological formations are described, including their age and lithology, in the generalised stratigraphy that is provided in table no.1. A thorough explanation of each group based on the stratigraphic data is provided below.

- Barail group:
    - Renji: This group is characterised by thin intercalations of shales, secondary/micaceous siltstones, thick-bedded, hard, bluish-grey sandstones, and sandstones with coal streaks present. The coal streaks, which point to the presence of organic material, imply a depositional environment that was probably marshy or deltaic and supported flora.
    - Jenam: This formation, which is made up of grey shales with coal streaks, splintery shales, siltstones, and sandstone interbands, suggests that conditions fluctuated between terrestrial and aquatic settings, which was advantageous for the production of coal deposits.

- Surma group:
    - Bokabil: Sandstones and rhythmites are interbedded with mudstones, siltstones, and dark grey shale in this formation. The periodic changes in sedimentation rates indicated by the presence of rhythmites may be caused by variations in water levels or the climate.

    - Bhuban: This formation, which consists of conglomerates, grey sandy shales, splintery shales, and dirty, greenish-grey, micaceous feldspathic sandstones, represents a complicated depositional history with varied sediment sources, probably influenced by both river and marine processes.
- Tipam group:
    - Girujan clay: Composed of mottled clays, sandy shale, and subordinate coarse to gritty sandstone, this formation indicates a transitional

environment where sedimentary processes from both land and water interacted.

- Tipam: characterised by micaceous, gritty, friable sandstones that are grey and brown in colour, with laminations of greyish clay. The presence of micaceous material implies a notable impact from weathered parent rocks, but the laminations signify varying depositional circumstances.

- Dupitila group:
    - Dupitila: This group includes lateritic conglomerate blocks with pockets and layers of pebble beds, soft, friable ferruginous sandstone, and mottled clays. While the speckled clays show variable depositional circumstances, potentially influenced by both terrestrial and marine habitats, the softness of the sandstone suggests a relatively recent development.
- Dihing group:
    - Gandhigram: Conglomerate, grit, sandstone, and clay strata make up this formation. Conglomerates indicate a high amount of energy in the depositional environment, and their presence is probably indicative of a close proximity to river systems, where larger particles may be transported and deposited.
- Newer Alluviam group:
    - Baskandi-Udarband: The most recent sediment deposits are represented by the sand, silt, and clay found in this formation. These materials are frequently found in floodplains and river valleys, where sedimentation and seasonal flooding cause them to collect.
    - Barpeta-I: This formation, with its somewhat older sedimentary environment and somewhat compacted sand, silt, and silty clay, suggests that compaction has occurred, resulting in a firmer substrate.

- Quarternary undifferentiated group:

    This group consists of undifferentiated fluvial sediments, primarity consistof sand, silt, and clay. These sediments are typically deposited by rivers and streams, these sediments are a reflection of dynamic sediment transport and erosion processes in relatively recent geological history.

General geology of Karimganj:

Karimganj district, located in the southern part of Assam, India, presents a fascinating geological profile shaped by a variety of geological processes and features. This district is part of the Barak

Valley, which lies within the broader geological framework of the Eastern Himalayas and the Indo-Gangetic Plain.

The region is predominantly characterized by alluvial deposits, a consequence of the sedimentation processes of the Barak River and its tributaries. These deposits have created fertile plains that are crucial for agriculture. The alluvial soil in Karimganj is rich and supports diverse crops, making it a significant agricultural area in Assam.

Geologically, Karimganj is situated on the eastern edge of the Indo-Gangetic Plain, which is a large sedimentary basin formed by the accumulation of sediments over millions of years. This basin is a result of the tectonic activities associated with the uplift of the Himalayas. The sedimentary layers in the region are primarily composed of silt, clay, and sand, which have been deposited by the river systems flowing from the north and the west, these alluvial deposits are relatively young, from the Quaternary period, and cover older sedimentary rocks that date back to the Miocene to Pleistocene epochs. . The district's landscape is also influenced by its proximity to the Khasi-Jaintia Hills to the north and the Mizo Hills to the south. These hills, part of the ancient crystalline basement rocks, contrast with the younger alluvial plains of Karimganj. The geological structure of these hills includes a mix of metamorphic and sedimentary rocks, which have been subjected to significant erosion over time. The sediment derived from these hills has contributed to the alluvial deposits in the Karimganj region.

Karimganj is situated in a seismically active zone due to the tectonic activity along the boundary of the Indian Plate and the Eurasian Plate. This tectonic activity is a key factor in the geological history of the region, influencing both the landscape and seismic activity in the area. Earthquakes and related geological phenomena have played a role in shaping the region’s topography and sedimentary patterns. Its geological profile is further marked by its river systems, particularly the Barak River and its tributaries. These rivers have carved out extensive river valleys and floodplains, contributing to the region's geomorphology. The river systems are dynamic, constantly reshaping the landscape through processes of erosion, sediment deposition, and flooding.

In summary, Karimganj district's geological character is defined by its alluvial plains, sedimentary deposits, and tectonic influences. The interaction of these geological factors creates a unique landscape that supports a rich agricultural economy and shapes the environmental and physical characteristics of the region.

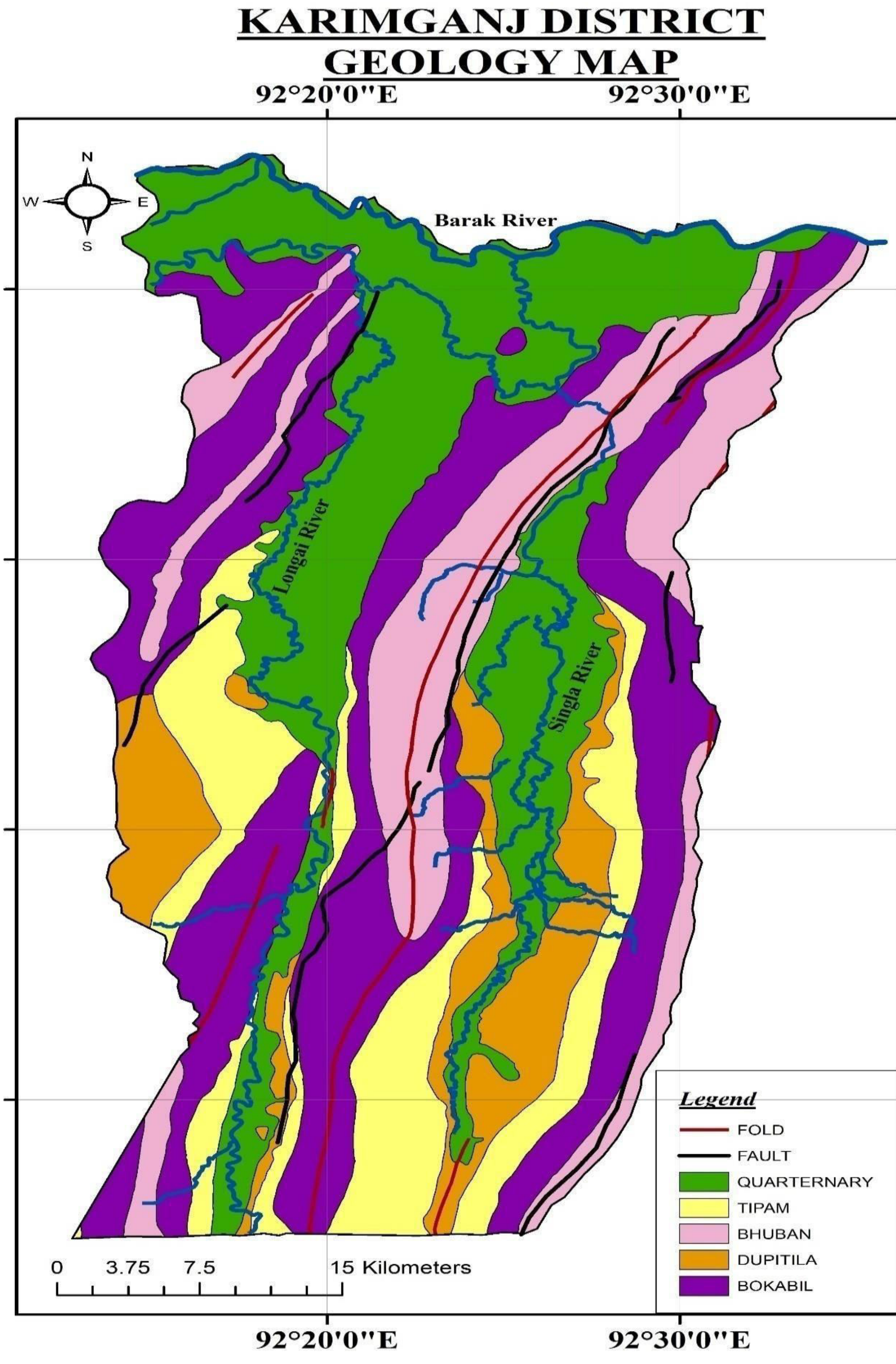
KARIMGANJ DISTRICT
GEOLOGY MAP
92°20'0"E
92°30'0"E
24°50'0"N
24°40'0"N
24°30'0"N
24°20'0"N
N
S
E
W
Barak River
Longai River
Singla River
Legend
FOLD
FAULT
QUARTERNARY
TIPAM
BHUBAN
DUPITILA
BOKABIL
0 3.75 7.5 15 Kilometers

Fig: Geological map of Karimganj (source:CGWB)

River bed Minerals: ………………………………………………………….

5.2 **River deposit:** Based of the following data:

5.2.1 **Origin of river:** Place of origin of any river is important to find out the potential river deposit. In this report the origin of all the rivers are already discussed in previous sections.

5.2.2 Catchment area: The districtKarimganj is having good potential for the minor mineral mining, mostly due to the catchment area of different rivers. The Catchemt area includes the North cachar Hills, Manipur Hills and Mizoram Hills. All these three hills are made up of Tertiary sedimentary succession. Since these are sedimentary succession, the weathering rate is very high. Also, These three hills are relatively new according to the geological time. Thus, the weathering rate is also high as well as the sediment production rate is also very high.

5.2.3 **General profile of the river:** The slope of few rivers within the district Karimganj is given below:

River Name	Starting elevation	End elevation
Longai	57 m	47m
Singla	67m	38m

It seems that the rivers are having good sediment carrying capacity as well as as they can deposit the sand in the later part of the river course.

5.2.3: Sedimentation Pattern: The bed topography of a river channel is expressed in terms of depositional and erosional features which are developed on channel beds as a result of interactions of channel flow and transport of sediment load both as suspended sediment load and bed-material load.It involves the transport of erosion products (boulders, gravel, sand silt and clays) from its catchment in the downstream direction by river. Sediment transport (ST) is an important geological factor, which is related to the mechanisms of sediment load production, transport, and deposition. It occurs when the flow is rapid enough to erode and move surficial sediments.There are two fundamental modes of sediment transport, the bedload in which particles **roll or slide** along the bed of a river or the sea, and the second in which the particles are entrained by the flow and move in suspension with the water mass.This transport takes place in the area near the bottom and is therefore a very important factor in the shaping of the river bed. In natural running waters, erosion and sedimentation processes are constantly alternating and characterize the bed load balance of the water route.**Suspended load transport** occurs as they float more or less continually within the moving fluid. Because sedimentary clasts are denser than the medium that is transporting them, they eventually settle out. Regardless of the agent involved, sedimentary clasts are transported and deposited only in certain ways. The sediment remains in constant contact with the bottom, that roll, such as stones while, some sediment grains abruptly leave the bottom and are temporarily suspended, essentially hopping, skipping, and jumping downcurrent in an irregular, discontinuous fashion termed as Saltation. Many saltating grains strike others, causing them to ricochet and jump into the saltating layer. Saltation load and Traction load together constitute the bedload.

The sediment load carried by river comes from various sources like the streams pick up coarse material from the Talus in hilly regions. Most of the sediments are derived from the beds and banks of rivers and seabed as a result of weathering and erosion of these rocks. Either physical or chemical weathering of the source rock produces these terriginous detrital fragments.The size of the sediment load is influenced by the geology of the basin as well as distance from the catchment area.The most important factors influencing the transport of sediments are the size, density, sorting, and the mechanical properties (cohesive or noncohesive) of particles.The maximum possible amount of solid matter, which specified water discharge can carry over, is called flow transporting capacity. It redistributes the sediment in a channel. If sediment discharges lesser than transporting capacity of a flow, bottom sediment is engaged in the channel process.Sometmes, its transporting capacity is affected mostly by diversion of river water or by Storing water in reservoir etc.

Basin area alone is not a determining factor of sediment yield. Smaller basins generally exhibit steeper slopes and steeper stream gradients than large basins and thus aid in large sediment yields, whereas large basins show low slopes and low stream gradients, and hence result in low sediment output. Basin area integrates several factors such as gradient, storage capacity, etc. which influence sediment yield. Because of these variables controls, rivers draining only 10% of the world's drainage basins account for more than 60% of the sediment discharge to the oceans.

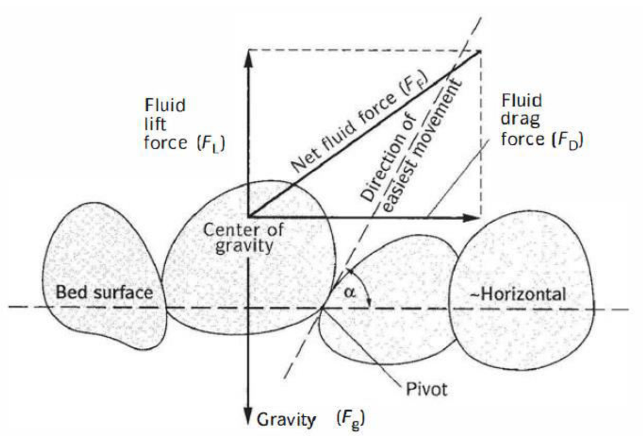

Figure:- Forces acting during fluid flow on a grain resting on a bed of similar grains.

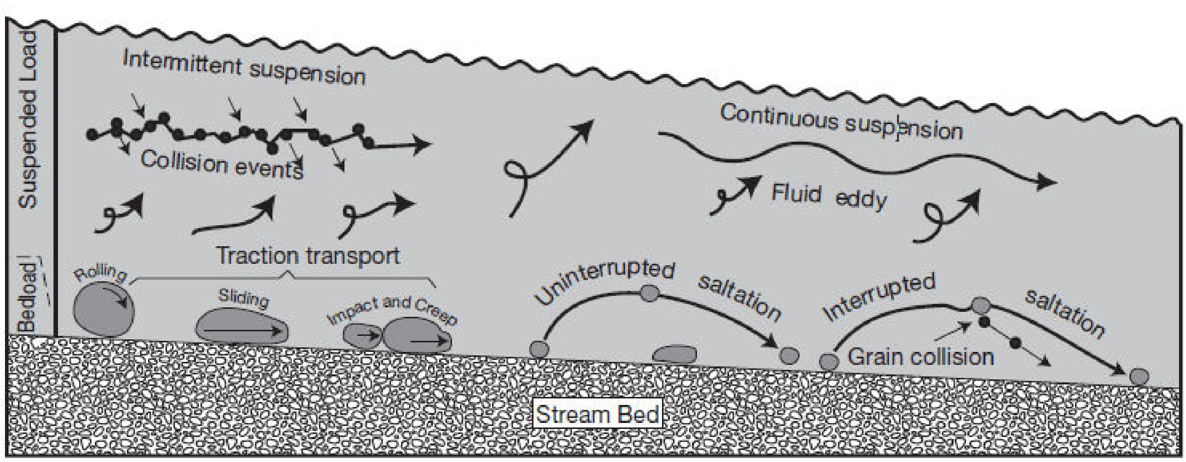

Figure: Schematic illustration of grain paths during bedload, suspension, and saltation transport. [Leeder, M. R., 1979]

FactorsSediment properties of individual particles that are important in the study of sedimenttransport are *particle size, shape, specific weight, density and fall velocity.*

Size and Shape

Size is the basic and most readily measurable property of sediment. Coarse sediment such as sand and gravel moves on or very close to the bed during transport and is considered to constitute the **bedload.**Finer material carried higher up in the main flow above the bed makes up the **suspended load**.Shape refers to the configuration of a particle regardless of its size or composition.Larger particles like gravel require more energy to be transported than smaller particles like silt.

Sediment Cohesion:-

With cohesive sediments, the resistance to erosion depends on the strength of the cohesive bond binding the particles, which influence how easily these sediments can be transported.Fine, cohesive sediments are often more difficult to erode and transport than non-cohesive sediments.

Sediment supply and Channel Morphology

The availability of sediment from upstream sources, such as erosion of riverbanks, hillslopes, or sediment inputs from tributaries, impacts sediment transport.On the other hand, Channel Morphology also affects river hydraulics such that steeper channels often have higher velocities and can transport larger particles.Moreover,The turbulence of the river flow and the rate of erosion along the riverbanks and bed can affect sediment transport. Higher turbulence can lift and carry more sediment.

Specific Gravity

The ratio of the particular weight or density of silt to the specific weight or density of water is known as specific gravity. Particular weight is a significant parameter that is widely applied in sediment transport and hydraulics. The degree of sediment consolidation determines the specific weight of the deposited sediment. It rises over time following the first deposition. Additionally, it is dependent on the sediment mixture's composition.

Density

A sediment particle's density indicates the minerals that make up that particle. Specific gravity is typically used to determine density. The majority of the particles in waterborne sediment are made of quartz, which has a specific gravity of 2.65.

Fall velocity

The relative flow conditions between the sediment particle and the water during the processes of sediment entrainment, transportation, and deposition are closely connected to the fall velocity, or terminal fall velocity, that a particle reaches in a quiescent column of water. The combined effect of the fluid's size, shape, specific gravity, surface roughness, and viscosity is reflected in the fall velocity. Higher velocities can carry larger and heavier sediments, while slower flows may only transport finer sediments. Increased water discharge typically enhances the river's ability to transport sediment.Moreover, rivers with high sediment loads will be able to carry more sediment with it.

Human Activities

Human activities such as Cutting down of trees in the upstream area, dam construction, river regulation etc can highly affect the sediment transport by rivers as well as amount of sediments supplied to the rivers.

5.2.4 Estimation of Sedimentation: There are two approaches to obtaining values describing sediment loads in streams. Oneis based on direct measurement of the quantities of interest, and the other on relationsdeveloped between hydraulic parameters and sedimenttransport potential.

The total bed material load is equal to the sum of the bedload and the bed material partof thesuspended load; in terms of volume transport per unit width, $q_t = q_b + q_s$. Here washload, i.e.that part of the suspended load that is too fine to be contained in measurable quantitiesin the river bed, is excluded from qs.There are number of equations to compute the total sediment load. Most of theseequations have some theoretical and empirical bases.

In 1973, Ackers and White developed a general theory for sediment transport which wascalibrated against the flume-transport data then available. Their functions have been widelyaccepted as one of the best available procedures for estimating the total bed over the full widthof the flow section.

Dendy Bolton formula is often used to calculate the sedimentation yield. But use of theseequationsto predict sediment yield for a specific location would be unwise because of the widevariabilitycaused by local factors not considered in the equations development. However, theymay providea quick, rough approximation of mean sediment yields on a regional basis.

Computed sediment yields normally would be low for highly erosive areas and high for wellstabilized drainage basins with high plant density because the equations are derived fromaveragevalues. The equations express the general relationships between sediment yield, runoff,and drainage area.

5.2.5 **Sediment Yeild:**The water that reaches a stream and its tributaries carries sediment eroded from theentire area drained by it. The total amount of erosional debris exported from such adrainagebasin is its sediment load or sediment discharge and the sediment yield is the sedimentdischarge divided by the total drainage area of the river upstream of the cross section at whichthe sediment discharge is measured or estimated. Sediment yield is generally expressed as avolume or weight per unit area of drainage basin—e.g., as tons per square kilometre. Further,sediment yield is usually measured during a period of years, and the results are thus expressedas an annual average.

5.2.6 Replenishment Study (following EMGSM guidelines, 2020): Replenishment study for a riverdepends on the sediment load for any river system and it should be done over a period. Theprocessin general is very slow and hardly measurable on season-to-season basis exceptotherwise the effectof flood is induced which is again a cyclic phenomenon. Usually,replenishment of sediment can be estimated in the following methods:

a) Satellite Imagery: It can be done by taking the satellite imagery both pre monsoon and post monsoon season. First of all, the potential sand deposit can be identified. The sand bar or deposit volume and depth can be checked for pre and post monsoon season of a year.

b) Direct field measurement of the existing leases involving estimation of thevolumediference of sand during pre- and post-monsoon period. Withsystematic data acquisition, a model has developed for calculation ofsediment yield and annual replenishment with variable components.

c) The replenishment estimation based on a theoretical empirical formula withthe estimation of bed-load transport comprising of analytical models tocalculate the replenishment estimation.

A. **Replenishment Study using Satellite image:** For this purpose, the lanset image have been downloaded from USGS. The landset image have been processed by composite different bands. After processing, land use/land cover (LULC) map, the total area of targeted sand deposit from the river bed/sand bar can be measured by using NDWI through ArcGIS software.

B. **Replenishment Study by direct field visit:** The following methodologies can be opted for the field study:

B.1 Field data collection: Field data has to be collected in minimum three times within a year. 1) pre monsoon data, 2) post monsoon data, 3) post mining data. For this purpose, different river sections of the district, like Rukni, Madhura, Jatinga, Kalain, Barak. For this draft report, all the river section with potential sand deposit have been visited to check the riverbed/bar sand deposit thickness and spatial distribution. Till now we are having only the monsoon data for the draft. We expect to have all the data in upcoming few months of this year. Relative elevation levels can be captured through GPS. Thickness of the sand bars was measured through sectional profiles. In few instances, where there was a problem regarding the sand grade, the sieve analysis of the sands was carried out in the laboratory to assess their particle size distribution.

B.2 Selection of the river profile: The potential sand deposit within the bar and riverbed has to be identified. In the Karimganj district few potential areas are as follows:

Longai River: The Longai River is a trans-boundary river in India and Bangladesh. It rises in the Jampui Hills of the Indian state of Tripura. It flows through some part of Mizoram before entering Karimganj district of Assam. Later it enters Bangladesh, and drains in Hakaluki Haor. Due to the meandering nature and almost zero slope in the Barak valley, it deposits high amount of sediment, mostly clay and silt on the flood plains, river banks and point bars of the river.

Singla River: The Singla River rises in the Jampui Hills of the Indian state of Mizoram. It flows through some part of Mizoram before entering Karimganj district of Assam. Later it enters Bangladesh. Due to the meandering nature and almost zero slope in the Barak valley, it deposits high amount of sediment, mostly clay and silt on the flood plains, river banks and point bars of the river.

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B3 Assessment of the sediment load: Assessment of sediment load in a river is subjective to study of the whole catchment area, weathering index of the various rock types which acts as a source of sediments in the specific river bed, rainfall data over a period not less than 20 years, and finally the detail monitoring of the river bed upliftment with time axis. Again, the sediment load estimation is not a dependent variable of the district boundary, but it largely depends upon the aerial extent of the catchment areas, which crosses the district and stateboundaries.

By taking all the data mentioned above the total estimation of the sediment/sand deposit for every river can be done.

C. Replenishment Study following empirical formula (theoretical): Sediment load deposition in a river is dependent on catchment area, weathering index of the various rock types of the catchment area, land-use pattern of the area, rainfall data and grain size distribution of the sediments. Again, the sediment load estimation is not a dependent variable of the district boundary, but it largely depends upon the aerial extents of the catchment areas, which crosses the district and state boundaries.Sedimentation in riverbed depends on catchment yield, peak flood discharge due to rainfall, bed load transport rates and sediment yield characteristic of the river. Some of the common methods used for replenishment study are explained below.

C1Catchment Yield Calculation: For a particular period of time the total amount of water expected from the entire catchment area is called the Catchment Yield. The annual yieldfrom acatchment is the end product of various processes such as precipitation, infiltration andevapotranspiration operating on the catchment.

The formula used to find out the catchment yeild is:

Catchment Yield (m3) =Catchment area (m2) × Runoff coefficient (%)×Rainfall (m)

The runoff generated from the watershed is analyzed using Strange's Table to get thereliable yield results. Runoff from a catchment is dependent upon annual rainfall as wellas catchment characteristics such as soil types and the type of groundcover / land usage.Runoff coefficient of the catchment has been established based on Strange's Table.Strange (1892) studied the available rainfall and runoff and obtained yield ratios asfunctions of indicators representing catchment characleris1ics (Subramanya, 2008).Catchments are classified as good, average and bad according to the relative magnitudes of yield of sediment. For example, catchment with good forest cover and having soils of highpermeability would be classified as bad, while catchment having soils of low permeability andhaving little or no vegetal cover is termed good. Since the amount of rain is too high in the entire north east India, the catchement yeild remais always high whereas the run-off coefficient for the Karimganj district varies in higher end like near to 60.

As per Weibull's Formula (Subramanya, 2008),

Return period/Recurrence interval = (n+1)/m

Where: n number of years on record;m is the rank of observed occurrences when arranged in descending order.

C2Peak Flood Discharge Calculation: Peak discharge is the highest concentration of the discharge, mostly the flood discharge. It is difficult to find out the exact mount since it depend on many parameters like flood length, flood intensity, morphological characteristic of the bed and catchment area. Thus, several formula/models are in use:

As per Dicken's formula (Subramanya, 2008)**,**

Q = CA3/4

Where: Q is Maximum flood discharge (m3/sec) in a river

A is Area of catchment in Sq. Km

C is Constant whose value varies widely between 2.8 to 5.6 forcatchments in plains and 14 to 28 for catchments in hills

As per Jarvis formula (Subramanya, 2008)**,**

Q = CA1/2

Where: Q is Maximum flood discharge (m3/sec) in a river

A is Area of catchment in Sq. Km

C is Constant whose value varies between 1.77 as minimum and177 as maximum. Limiting or 100 percent chance floods are givenby the value of C of 177

As per Rational formula ((Subramanya, 2008)**,**

Q = CIA

Where: Q is Maximum flood discharge (m3/sec) in a river, A is Area of catchment in Sq. Km

C is Runoff coefficient which depends on the characteristics of thecatchment area. It is a ratio of runoff: rainfall

I is Intensity of rainfall (in m/sec)

C3 Bedload Transportation calculation: Three modes of transport namely; rolling, sliding and saltation may occur simultaneously in bed load transport (see previous section 5.2.3). There are number of equations to compute the total sediment load. Most of these equations have some theoretical and empirical bases.

Ackers and White Equation:

Ackers and White (1973) used dimensional analysis based on flow power concept and their proposedformula is as follows.

$$C_t = C_s G_s\,(d_{50}/h)\,(V/U_*)^{n'}\,[(F_{gr}/A_1) - 1]^{m}$$

The dimensionless particle dgr is calculated by:

$$d_{gr} = d_{50}\,(g(G_s-1)/v^2)^{1/3}$$

The particle mobility factor Fgris calculated by:

$$F_{gr}=(U_{\times}n'/(Gs-1)g\ d_{50})^{1/2} \times (V/(5.66\log(10h/d_{50}))^{1-n'}$$

Where,

$A1$ = Critical particle mobilityfactor

Cs = Concentration coefficient in the sediment transportfunction

Ct = Total sediment concentration

$d50$ = Median grainsize

dgr = Dimensionless particle diameter

Fgr = Particle mobilityparameter

g = Acceleration ofgravity

Ds, Sg = Specific gravity

h = Waterdepth

m = Exponent in the sediment transportfunction

n' = Manning roughnesscoefficient

$U*$ = Shear velocity

V = Mean flowvelocity

ν = Kinematic viscosity

C4 Sediment Yeild: Sedimentation occurs as the velocity decreases along with its ability to carry sediment. Coarse sediments deposit first, then interfere with the channel conveyance, and may cause additional river meanders and distributaries. The area of the flowing water expands, the depth decreases, the velocity is reduced, and eventually even fine sediments begin to deposit.There are many sediment transport equations which are suitable for use in theprediction of the rate of replenishment of river. Some of the famous sediment transportequations are:

1. Dendy – Bolton Equation
2. Yang Equations
3. Engelund-Hansen Equation
4. Modified Universal Soil Loss Equation (MUSLE) developed by Williams and Berndt (1977)

Only the Dendy- Bolton equation is described here.

Dendy-Bolton determined the combined influence of runoff and drainage area on sediment yield to compute the sediment yield. They developed two equations i.e. for run off less than 2 inch and for run off more than 2 inch, which are given below:

For run off less than 2 inch:

$$(Q<2in)\ S=1289\times (Q)\ 0.46\times [1.43-0.26\ \text{Log}\ (A)]$$

For run off more than 2 inches:

$$(Q > 2\ in):\ S= 1958\times (e\ -0.055\times Q) \times [1.43-0.26\ \text{Log}\ (A)]$$

Where,

S = Sediment yield (tons/sq miles/yr)

Q = Mean Annual runoff (inch)

A = Net drainage are in sq mile

4. PHYSIOGRAPHY OF KARIMGANJ DISTRICT:

The district is marked by its diverse landforms, prominently featuring the expansive alluvial plains of the Barak River and its tributaries. The district’s flat and fertile plains are predominantly composed of alluvial soil, deposited by sediment-laden river waters. These plains are ideal for agriculture, supporting a wide range of crops due to their rich soil. Surrounding the central alluvial expanse, the landscape transitions into hilly regions. To the north, the district is bordered by the Khasi-Jaintia Hills, which are characterized by rugged terrain and steep slopes formed from crystalline and metamorphic rocks. To the south, the Mizo Hills extend into the district, contributing to a varied topography with elevated ridges and deep valleys. These hilly areas contrast sharply with the surrounding plains and influence the district’s geomorphology by creating a natural boundary and impacting local climate and vegetation.

The drainage pattern is intricately tied to its topographical features, with the Barak River serving as the primary drainage system. Flowing southward, the Barak River carves out a broad valley and creates extensive floodplains through sediment deposition. Its tributaries, such as the Kushiara, Dhaleshwari, and Singla rivers, further dissect the plains, forming a complex network of channels and smaller valleys. These tributaries contribute to a well-developed river system that supports agriculture and natural drainage. In the hilly regions, the drainage pattern is less organized due to the rugged terrain, with runoff from the Khasi-Jaintia and Mizo Hills flowing into the river systems, which influences the groundwater recharge and seasonal water availability. The district’s drainage system reflects a dynamic interplay between the flat alluvial plains and the surrounding hilly areas, shaping both surface water flow and groundwater conditions.

Karimganj district, located in the southern part of Assam, India, presents a fascinating geological profile shaped by a variety of geological processes and features. This district is part of the Barak Valley, which lies within the broader geological framework of the Eastern Himalayas and the Indo-Gangetic Plain.

The region is predominantly characterized by alluvial deposits, a consequence of the sedimentation processes of the Barak River and its tributaries. These deposits have created fertile plains that are crucial for agriculture. The alluvial soil in Karimganj is rich and supports diverse crops, making it a significant agricultural area in Assam.

Geologically, Karimganj is situated on the eastern edge of the Indo-Gangetic Plain, which is a large sedimentary basin formed by the accumulation of sediments over millions of years. This basin is a result of the tectonic activities associated with the uplift of the Himalayas. The sedimentary layers in the region are primarily composed of silt, clay, and sand, which have been deposited by the river systems flowing from the north and the west. The district's landscape is also influenced by its proximity to the Khasi-Jaintia Hills to the north and the Mizo Hills to the south. These hills, part of the ancient crystalline basement rocks, contrast with the younger alluvial plains of Karimganj. The geological structure of these hills includes a mix of metamorphic and sedimentary rocks, which have been subjected to significant erosion over time. The sediment derived from these hills has contributed to the alluvial deposits in the Karimganj region.

Karimganj is situated in a seismically active zone due to the tectonic activity along the boundary of the Indian Plate and the Eurasian Plate. This tectonic activity is a key factor in the geological history of the region, influencing both the landscape and seismic activity in the area. Earthquakes and related geological phenomena have played a role in shaping the region's topography and sedimentary patterns. Its geological profile is further marked by its river systems, particularly the Barak River and its tributaries. These rivers have carved out extensive river valleys and floodplains, contributing to the region's geomorphology. The river systems are dynamic, constantly reshaping the landscape through processes of erosion, sediment deposition, and flooding.

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LIST OF EXISTING MINING CONTRACT UNITS UNDER KARIMGANJ FOREST DIVISION UNDER THE DISTRICT OF KARIMGANJ

Sl No	Name of MCAs / MPAs	Name of District	Geolocation		Total Area in Ha	Forest Division	Volume Per Year
1	Longai Sand MMU No. 1 ©	Karimganj	N24°34'34.15" N24°34'33.07" N24°33'47.61" N24°33'45.73	E92°19'2.79" E92°19'2.55" E92°19'50.21" E92°19'49.55"	10.3	Karimganj ForestDivision	10,000 CuM

2	Longai Sand MMU No. 2	Karimganj	24°44'39.30"N 24°44'39.28"N 24°43'34.64"N 24°43'34.96"N 24°38'43.84"N 24°38'42.63"N 24°38'36.38"N 24°38'35.97"N 24°36'16.79"N 24°36'17.33"N 24°36'18.21"N 24°36'19.28"N 24°35'32.84"N 24°35'33.01"N 24°35'16.90"N 24°35'16.58"N	92°20'46.77"E 92°20'46.14"E 92°20'17.09"E 92°20'16.61"E 92°18'6.09"E 92°18'6.03"E 92°18'19.47"E 92°18'18.68"E 92°18'43.09"E 92°18'43.20"E 92°18'21.54"E 92°18'22.16"E 92°17'49.77"E 92°17'48.90"E 92°17'57.00"E 92°17'55.87"E	4.98	Karimganj Forest Division	
3	Longai Sand MM Unit No.3	Karimganj	24°45'6.38"N 24°45'6.67"N 24°50'59.66"N 24°50'58.28"N	92°20'56.20"E 92°20'55.70"E 92°20'41.61"E 92°20'40.97"E	4.9	Karimganj Forest Division	
4	Singla Sand MMU Block A	Karimganj	24°26'9.03"N 24°26'7.90"N 24°25'28.45"N 24°25'27.68"N	92°25'49.94"E 92°25'49.29"E 92°25'26.82"E 92°25'27.12"E		Karimganj Forest Division	
5	Singla Sand MMU No.1(A)	Karimganj	24°26'9.03"N 24°26'7.90"N 24°25'28.45"N 24°25'27.68"N	92°25'49.94"E 92°25'49.29"E 92°25'26.82"E 92°25'27.12"E	4.96	Karimganj Forest Division	12,000 CuM
6	Singla Sand MMU No.1(B)	Karimganj	24°27'04.98"N 24°27'4.72"N 24°27'21.33"N 24°27'21.30"N 24°27'27.69"N 24°27'26.59"N 24°27'40.59"N 24°27'40.16"N	92°25'34.66"E 92°25'33.56"E 92°25'21.55"E 92°25'22.76"E 92°25'41.69"E 92°25'41.85"E 92°25'44.65"E 92°25'45.07"E	4.97	Karimganj Forest Division	12,000 CuM
7	Singla Sand MMU No.1(C)	Karimganj	24°28'55.68"N 24°28'55.12"N 24°27'58.99"N 24°27'58.95"N	92°25'53.00"E 92°25'53.60"E 92°25'52.52"E 92°25'51.58"E	4.94	Karimganj Forest Division	

8	Singla Sand MMU No.2	Karimganj				Karimganj Forest Division	
9	62 Hal Baruala Sand MM Unit	Karimganj	24°33'32.8"N 24°35'25.5"N	92°25'55.9"E 92°26'17.8"E	3.74	Karimganj Forest Division	
10	20 No. Ghat Longai Sand MM Unit	Karimganj	24°27'24.9"N 24°27'49.6"N	92°18'45.9"E 92°19'10.0"E	2.87	Karimganj Forest Division	
11	Barak Sand MMU No.1	Karimganj	BLOCK(A) 24°54'21.31"N 24°54'21.90"N 24°54'11.03"N 24°54'11.46"N BLOCK(B) 24°53'41.84"N 24°53'43.35"N 24°53'11.63"N 24°53'12.22"N BLOCK© 24°52'30.63"N 24°52'32.32"N 24°52'23.29"N 24°52'22.52"N BLOCK(D) 24°52'8.45"N 24°52'7.58"N 24°52'2.91"N 24°52'3.91"N	BLOCK(A) 92°42'46.23"E 92°42'45.38"E 92°42'39.27"E 92°42'38.61"E BLOCK(B) 92°42'22.09"E 92°42'20.51"E 92°42'9.35"E 92°42'7.38"E BLOCK© 92°43'6.20"E 92°43'5.68"E 92°43'40.19"E 92°43'39.18"E BLOCK(D) 92°42'8.94"E 92°42'8.64"E 92°41'49.20"E 92°41'48.63"E	12.7	Karimganj Forest Division	10,200 CuM

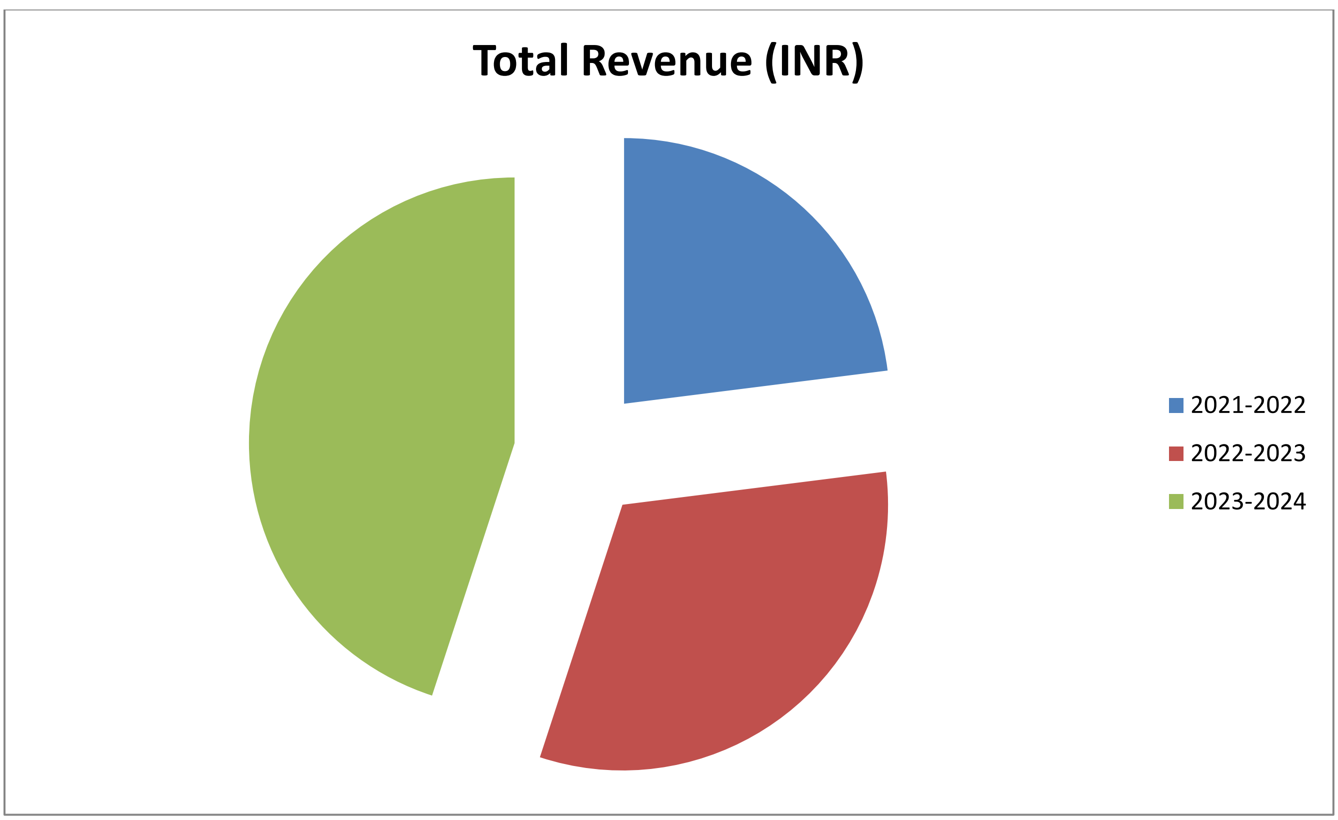
Sl No	Name of MCAs / MPAs	Name of District	Geolocation		Total Area in Ha	Forest Division	Volume Per Year
14	PATTA LAND EARTH(RED SOIL) MINING PERMIT AREA AT KITTE KUKURDI MOUZA	Karimganj	24°50'11.59"N 24°50'11.17"N 24°50'10.74"N 24°50'10.26"N 24°50'9.84"N 24°50'9.43"N 24°50'8.90"N 24°50'9.03"N 24°50'9.09"N 24°50'9.29"N 24°50'9.32"N 24°50'9.10"N 24°50'9.48"N 24°50'10.56"N 24°50'10.51"N 24°50'10.81"N 24°50'11.69"N 24°50'11.58"N 24°50'11.52"N	92°18'29.77"E 92°18'29.71"E 92°18'29.61"E 92°18'29.51"E 92°18'29.39"E 92°18'29.27"E 92°18'29.04"E 92°18'28.22"E 92°18'27.41"E 92°18'26.46"E 92°18'25.89"E 92°18'25.39"E 92°18'24.69"E 92°18'24.98"E 92°18'26.11"E 92°18'26.86"E 92°18'27.18"E 92°18'27.95"E 92°18'28.89"E	0.79	Karimganj Forest (T) Division	27,650 CuM
16	PATTA LAND ORDINARY EARTH MINING AREA AT TIKAR MOUZA	Karimganj	24°48'15.73"N 24°48'15.41"N 24°48'14.71"N 24°48'14.04"N 24°48'13.74"N 24°48'13.55"N 24°48'13.08"N 24°48'12.25"N 24°48'11.84"N 24°48'11.49"N 24°48'10.96"N 24°48'11.59"N 24°48'10.72"N 24°48'11.21"N 24°48'12.24"N 24°48'13.10"N 24°48'13.98"N 24°48'14.91"N 24°48'14.14"N 24°48'13.87"N 24°48'14.49"N 24°48'15.29"N	92°29'12.64"E 92°29'13.26"E 92°29'13.48"E 92°29'13.84"E 92°29'13.76"E 92°29'12.95"E 92°29'12.54"E 92°29'12.92"E 92°29'13.33"E 92°29'12.64"E 92°29'11.97"E 92°29'9.69"E 92°29'9.20"E 92°29'8.19"E 92°29'7.60"E 92°29'8.30"E 92°29'8.82"E 92°29'9.29"E 92°29'9.94"E 92°29'10.64"E 92°29'11.05"E 92°29'11.33"E	1.54	KARIMGANJ FOREST (T) DIVISION	30,062 CuM

1. Probable and Potential sand mining areas

(A) Stone	Revenue land	Forest/PA land	Other land
		-	-
		-	-
		-	-
		-	-
		-	-
		-	-
		-	-
(B) Clay/Silt	-	-	-
	-	-	-
	-	-	-
	-	-	-
	-	-	-
C) Sand	-	-	1) Kalacherra Area (Longai river)
	-	-	2) Jogicherra Area (Longai river)
	-	-	3) Near Neelam Bazar Area (Longai river)
	-	-	4) Near Neelam Bazar Area (Singla river)
	-	-	5) Longai MMU 3 Area (Longai river)
(D) Earth	1) Ramprasadpur (hills)	-	1) Patta Land
	2) Tikor Mouza (hills)	-	2) Patta Land
	3) Latu Area	-	-
	4) Karnamadhu Area	-	-
	5) Katirail Area	-	-
	6) Kukurdi Mouza Area	-	-

1. **Revenue generated through mining**:

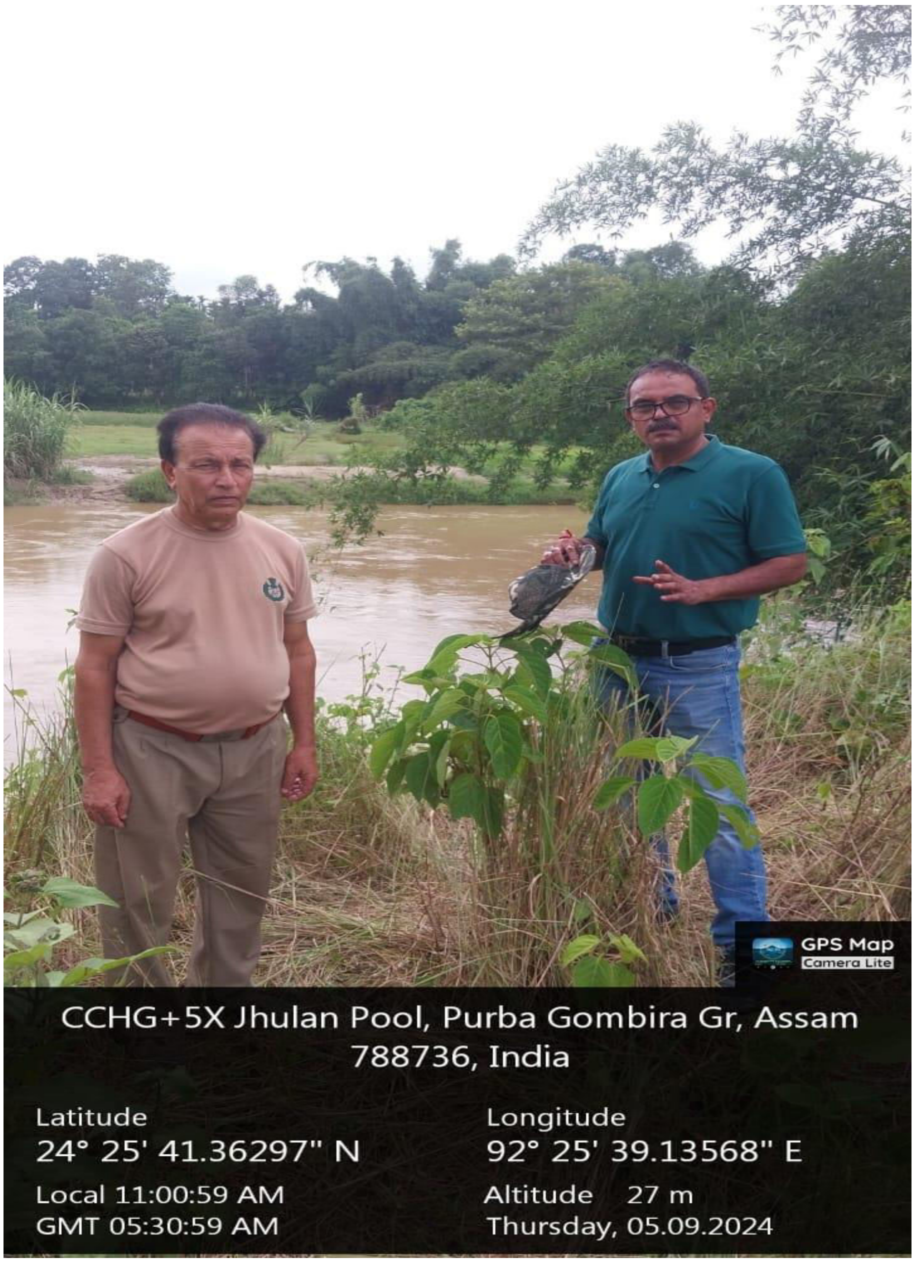
FY Year	Total Revenue (INR)
2021-2022	11,58,67,033
2022-2023	16,12,89,720
2023-2024	22,64,98,617



2. Photographs of site inspection with Office of The Divisional Forest Officer, Karimganj Division:

Singla MCA 1:

Singla MCA 3:


GPS Map
Camera Lite
CCHG+5X Jhulan Pool, Purba Gombira Gr, Assam
788736, India
Latitude
24° 25' 41.36297" N
Longitude
92° 25' 39.13568" E
Local 11:00:59 AM
GMT 05:30:59 AM
Altitude 27 m
Thursday, 05.09.2024

Singla MCA 2:


GPS Map
Camera Lite
FC4G+GH, Pachim Lalcherra, Assam 788736, India
Latitude
24° 27' 24.46607" N
Longitude
92° 25' 29.86748" E
Local 11:54:30 AM
GMT 06:24:30 AM
Altitude 23 m
Thursday, 05.09.2024

Singla MCA 4:


GPS Map
Camera Lite
FCMJ+47M, Dullabcherra Station Rd, Dullabcherra, Dhupanpur, Assam 788736, India
Latitude
24° 28' 55.31822" N
Longitude
92° 25' 50.93929" E
Local 12:10:35 PM
GMT 06:40:35 AM
Altitude 24 m
Thursday, 05.09.2024

Longai Sand MCA 1C:

Longai Sand MCA 1(A & B)


GPS Map
Camera Lite
Unnamed Road, Purbo Pecharghat, Assam 788735, India
Latitude
24° 31' 15.32712" N
Longitude
92° 20' 12.48288" E
Local 04:32:26 PM
GMT 11:02:26 AM
Altitude 30 m
Thursday, 05.09.2024

SAND MINING GUIDELINES:

In order to ensure sustainable and systematic sand mining with monitored protection ofenvironment, the guidelines laid down in following documents are followed:

1) Sustainable Sand Mining Management Guidelines 2016 by MoEF&CC.

2) Enforcement & Monitoring Guidelines for Sand Mining 2020 by MoEF&CC.

3) Assam Minor Mineral Concession Rules, 2013.

The above documents have been strictly adhered to during Preparation of Mining Plan and Progressive Mine Closure Plan under the guidance of a registered RQP. This will facilitate grant of any mineral concessions like "Mining Lease", "Mining Contract" or "Mining Permit" in respect of minor minerals for systematic, scientific and progressive development of all mines, quarries as well as river bed mining. As per guidelines prescribed in above said documents, special attention has been given on the following aspects:

1) The permanent boundary pillars need to be erected after identification of an area of aggradation and deposition outside the bank of the river at a safe location for future surveying. The distance between boundary pillars on both sides of the bank shall not be more than 100 meters.

2) Proper channelization of river is to be carried out so as to avoid the possibility of flooding and to maintain the flow of rivers.

3) The mining plan should include original ground level (OGL), available from District Survey Report (DSR) and to be recorded at an interval not more than 10 m x 10 m along and across the length of the river. Area of aggradation /deposition needs to be ascertained by comparing the level difference between the OGL and water level.

4) Riverbed sand mining shall be restricted within the central 3/4th width of the river/ rivulet or 7.5 meters(inward) from river banks but up to 10% of width of the river. Central 3/4th part of the river needs to be identified on a map, out of which the area of deposition / aggradation needs to be identified. Remaining 1/4th area needs to be marked as 'no mining zone'.

5) The sediment sampling should include the bed material and bed material load before, using and after the extraction period. The above exercise by DSR require four surveys i.e. 1st survey in the month of April, 2nd survey at the time of closing of mines for monsoon, 3rd survey needs to be carried out after

monsoon to know the quantum of material deposited/replenished and the 4th survey to be carried out at the end of March to know the Quantum of material excavated. The above information will be available in District Survey Report (DSR).

6) The particle size distribution and bulk density of deposited material are required to be assessed by a NABL recognised laboratory.

7) Depth of mining should be restricted to 3 meters and distance from the bank should be 1/4th of the river width and should not be less than 7.5 meters. Alternatively, distance from the bank should be 3 meters or 10% of the river width, whichever is less.

8) Demarcation of mining area with pillars and geo-referencing should be done prior to of mining operation.

9) A buffer distance/ un-mined block of 50 meters after every block of 1000 meters over which mining is undertaken, shall be maintained.

10) Sand and gravel may be extracted across the entire active channel during the dry season only. No sand mining during monsoon session, as defined in DSR or IMD for each state.

11) Sand and gravel shall not be extracted up to a distance of 1 km from major bridges and highways on both sides, or five (5) times span of a bridge/public civil structure(including water intake points) on up-stream side and ten(10) times the span

of such bridge on down- stream side, subjected to a minimum of 250 meters on the upstream side and 500 meters on the downstream side.

12) Sand and gravel shall not be allowed to be extracted where erosion may occur, such as, at the concave bank.

13) River mining from outside should not affect rivers. No mining shall be permitted in an area up to a width of 100 meters from the active edge of the embankments or distance prescribed by irrigation department. The mining from area outside river bed shall be permitted subject to a condition that a safety margin of two (2) meters shall be maintained above the groundwater level while undertaking mining operation.

14) Sand and gravel shall not be extracted within 200 to 500 meters from any crucial hydraulic structure such as pumping station, water intakes.

15) All sand carrying vehicle (from source to destination) to be tracked through GPS or RFID. There should be one entry and exit point for trucks / dumpers. Project Proponent should carryout effective monitoring of the same. In case of vehicle break- down, the validity of transport permit can be extended by State Authority, if so required.