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RESEARCH ARTICLE

WHITE CLAY DEPOSITS AT DIFFERENT AREAS OF MADHABPUR AND BAHUBOL UPAZILA, HABIGONJ DISTRICT, BANGLADESH

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Abstract

A detail geological investigation was carried out in order to explore white clay deposit at 10 square kilometer areas of Madhabpur and 0.5 square kilometer areas of Bahubol Upazilas in Habiganj District of Bangladesh using hand auger and shallow drilling method. The whole surveyed area was identified for white clay deposits from qualitative as well as quantitative aspect. These deposits were marked at depths from 0.2 meter to 8.0 meter below the surface. Average thickness of white clay at Madhabpur and Bahubol area are 4.0 meter and 5.0 meter, respectively. The estimated reserve of white clay at Madhabpur area is about 68 million tons and that at Bahubol area is 2.8 million tons. Geological investigation suggests that the source rock near Tripura ranges was weathered, transported and deposited as feldspathic sandstone surrounding the present deposition of white clay. Later the sandstone was exposed and much of its feldspar content were weathered to the clay mineral (Kaolinite). Along with white clay; peat, peaty clay, sticky clay and silica sand were also observed at depths ranging from 1.5 to 8 meter. Collected white clay samples are yellowish grey to light grey in color and highly compact in dry condition but pasty in wet condition. The dry white clay is soapy to feel, slakes in water, moderately sticky and plastic in nature. Al_2O_3 content ranged from 25.51 to 27.61% while average SiO_2 , and Fe_2O_3 content were found 54.58 and 3.872% respectively. Considering the physical and chemical properties the white clay of the studied area can be considered as moderate to good in quality. This white clay can use in ceramics and other industries. Therefore, this deposit of white clay may help to meet the current national demand and consequently to increase the economic growth.

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Introduction:-

The Economic Geology and Resource Assessment Branch of the Geological Survey of Bangladesh (GSB) is responsible for the discovery of mineral resources (except oil and gas) disseminated throughout the country. Various exploration programs are being implemented by this branch to explore mineral resources, such as coal, peat, glass sand, white clay, limestone, hard rocks. Accordingly, a revenue financed program 'White Clay Exploration at Madhabpur and Bahubol Upazilas of Habiganj District' with a view to estimate the reserve, extent, and economic

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feasibility of the white clay deposit were carried out. It was implemented under the annual field program of 2014-15 from December 2014 to January 2015.

Location, Extent, and Accessibility of the Study Area

The area contained in the Survey of Bangladesh Topographic Quadrangles 78M/5, 78P/3, 78P/7 in 1:50,000 scale. It lies between $24^{\circ}02'00''\text{N}$ to $24^{\circ}08'00''\text{N}$ latitudes and $91^{\circ}16'00''\text{E}$ to $91^{\circ}24'00''\text{E}$ longitudes. About 10 km^2 area was explored. It comprises mostly in Madhabpur and a few in Bahubal Upazilas of Habiganj District (Figure-1 and 2). The Dhaka-Sylhet Highway runs through the western part of the surveyed area. The nearest bus stations are at Jagadishpur (Muktijoddha Chatter) and Madhabpur. There are some sub roads leading to the investigated areas from the highway. Most notable one is Jagadishpur-Shahpur roads by which medium to light weight vehicles can be run. The Dhaka-Sylhet railway is along the west margin of surveyed area and the Noapara railway station is the nearest one.

Previous Investigations

The eastern part of the surveyed area is included in Bakar's (1977) study on the Quaternary geomorphic evolution in the eastern part of Bangladesh and he identified the Madhupur Clay on the western side of the Raghunandan Hill. Rahman et. al. (1969) studied the geology of Shahjibazar- Srimangal area, Habigonj-Moulvibazar Subdivision. In this area, the Habiganj Gas Field was discovered in 1963. Several published studies and consultancy reports on the on the geology and hydrocarbon prospects of this region may be found in Bangladesh Oil, Gas and Mineral Corporation (Petrobangla) in Dhaka. Haq et.al.(2003) investigated the geology of the southern part of Habiganj District. Besides, some studies were carried out in these areas by the CDMB-GSB and Singapore University- GSB.

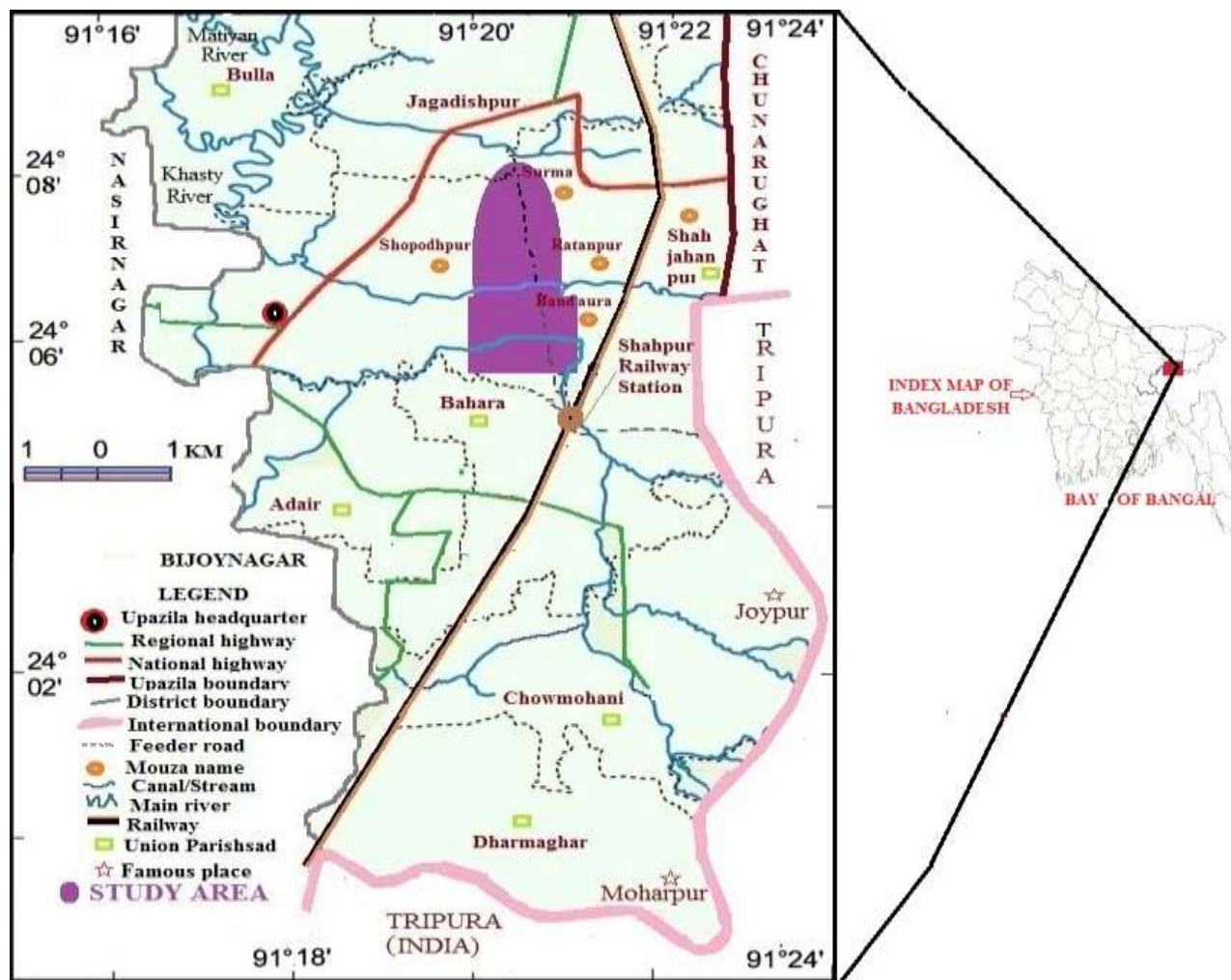


Figure 1:- The location map of the study area, Madhabpur Upazila, Habiganj District, Bangladesh.

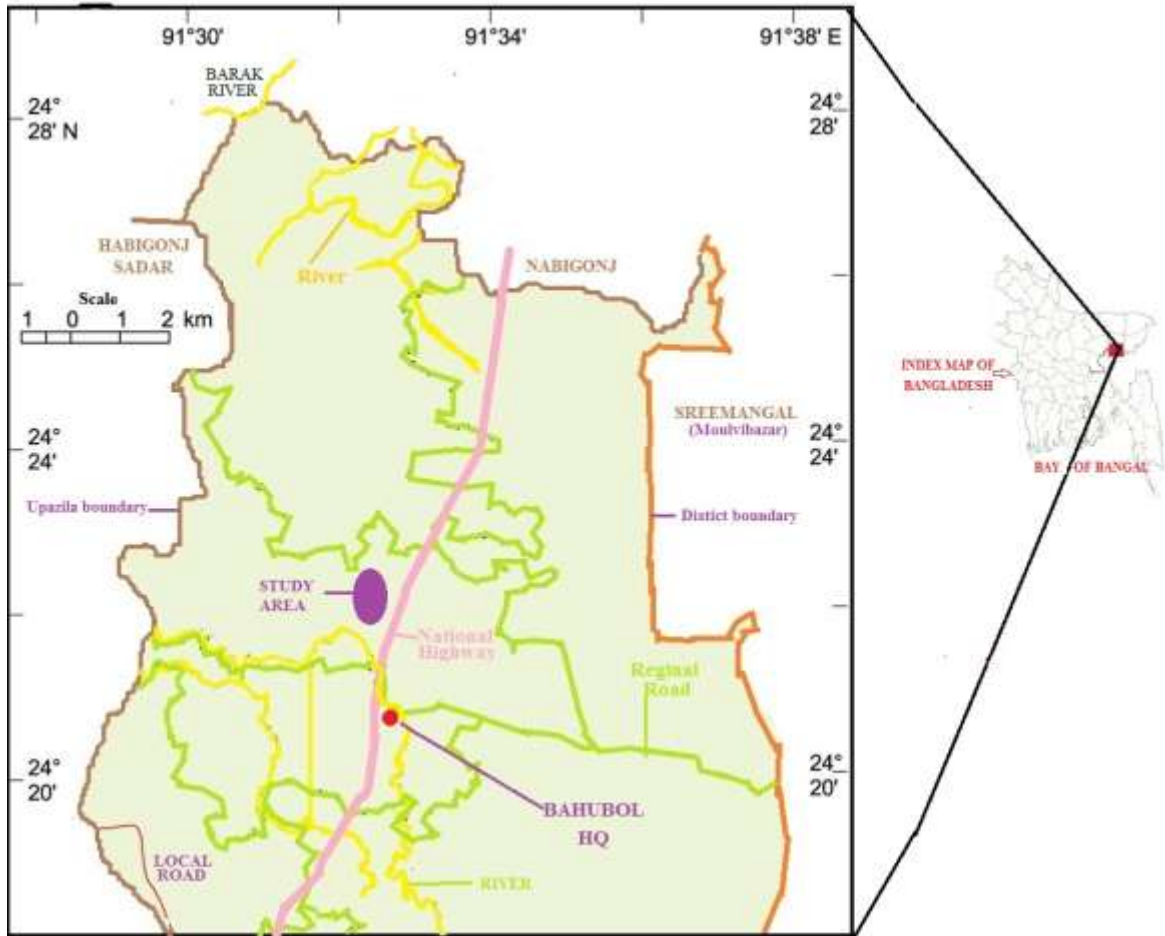


Figure 2:- The location map of the study area, Bahubol Upazila, Habiganj District, Bangladesh.

Purpose and Scope

This report is a representation of the activities involving the exploration of white clay at different areas of Madhabpur and Bahubol Upazilas. The field investigation and laboratory analysis were carried out to estimate the quality, quantity, and usability of white clay deposits. Several types of maps, such as location map, auger point map, some diagrams were prepared to clearly demonstrate the study area. A three-dimensional model, a Fence diagram and two cross-sections were also prepared to portray the distribution of the white clay deposits. The main objective of this study was to explore the white clay deposits including their thickness, extent, reserve, and economic feasibility.

Methodology:-

In the study area, white clay occurs at shallow depths, which were explored by using hand auger and shallow drilling methods. An auger is a hand operated apparatus with a cutting bit at one end of a stainless-steel pipe. At the other end there is a handle. The bit is designed such a way that when the auger is rotated vertically by rotating the handle into the ground, it penetrates the ground and when the bit is withdrawn from the ground the bit is filled with samples from a particular depth. This method is especially used for digging into cohesive sediments, such as clay, silty clay, silt, peaty clay, peat, and white clay. The exploration activities were applied in the study area at some stages (Plate-1). At the first stage, borehole locations were selected with the help of global positioning system device (Garmin GPS map 76cCSx) and coordinate data (latitude and longitude) were collected. The distance from one hole to another hole is 100 m to 200 m. At the second stage, the boreholes were dug with the help of auger and bit obtaining samples laid on the surface along a line according to the orientation of the samples. At the third stage, lithological data of each bore hole (ranges from 0.5 m to 11.0 m below the ground surface) were collected. The samples were observed closely and examined using tools, such as soil color chart, grain size chart, hand lens, and acids. Locations

and lithologic data along with physical properties of white clay were documented in field notebooks. Photographs of samples were taken at different places. At the fourth stage, samples were collected and preserved in airtight polythene bags and tightly packed inside a cotton sack for further analysis in the laboratory. At the fifth stage, field data were typed into a spread sheet file for storage and analysis using suitable software. Location data (latitude and longitude) were used for preparing location maps and lithologic data were used for lithologs, 3-D model, fence diagram, cross-sections, map preparation. Strater application were used for lithologs preparation. Rockworks (16 Level 5) software were used for preparing the 3D model, fence diagram. At the final stage, this report was prepared with the help of the combination of above materials in the Laboratory of Economic Geology and Resources Assessment Branch of Geological Survey of Bangladesh.



Plate-1:- The white clay exploration activities using auger method/shallow boring method; (A) An auger is vertically penetrating the subsurface, (B) A close view of auger removing from the hole, (C) Whole auger view after removed from the hole, (D) Finally, the sample was cutting and laid in a line to maintain consistency of operation, Madhabpur area, Habigonj district.

Acknowledgement:-

The authors are grateful to the Deputy Commissioner (DC) and Superintendent of Police (SP) of Habiganj District and Upazila Nirbahi Officer (UNO) of Madhabpur and Chunarughat Upazilas for arrangement of accommodation and security during the field work. The authors are highly thankful to the local people of surveyed area for their friendly and polite response. The authors would like to express their thanks and gratitude to their colleagues of the GSB for their cooperation during the field survey and report preparation. The authors would like to express their thanks and gratitude to Dr. Md. Nehal Uddin, former Director General, GSB for his valuable suggestions, guidance and supports during the field work, data analysis, and report preparation. The authors are indebted to Mr. Md. Khairul Islam, former Director General (DG), GSB for his valuable comments and advices during the field work.

The authors are also highly indebted to Honorable Director General of GSB for his kind permission to work in the field and advices, directions during the period of surveyed time.

Geology Of The Area

General Geology

The study area comprises of the southeastern side of Sylhet Trough and northeastern part of Bangladesh occupying in the District of Habiganj. The Holocene alluvial sediments of the Khowai-Kushiyara floodplains cover the entire areas, which are all surficial sediments of the latest Holocene age. Extensive low-lying area with big depressions and flood basins occupy the major portion of these floodplains. The vast thickness of sediments filling of Sylhet Trough were folded in the Late Miocene period to form the Indo-Burman Ranges, a sequence of north-south trending anticlines extending from 91°E eastwards into Myanmar (Goodbred, et. al, 2003). The amplitude of the anticlines increases eastwards and plunges northwards into the trough where they are submerged beneath the more recent sediments. In the north, however, the submergence of the anticlines has been resisted and they are exposed as outliers at Chatak and Sylhet. In the southern part of the trough the anticlines are exposed as low hills.

The study area is between two Hill ranges, i.e., Raghunandan and Tarap, which are mainly formed by the sedimentary deposits. These deposits are diverging out toward north and found to extend near Habiganj and Bahubal towns. The study area always remains above the normal flood level, but sometimes is inundated by the flash flood.

Stratigraphy of the Habiganj Area

The study area consists of the floodplain sediments of Late Holocene age, but the Dupi-Tila sediments of the Plio-Pleistocene age is in the hill ranges. The unconsolidated sandstone member of the Dupi-Tila Formation is the oldest exposed rock in this area. The sediments are unconsolidated and dominated by smaller fragments. The detail stratigraphic description of southern Habiganj district are mentioned below.

Table 1:- Generalized stratigraphic units of southern Habiganj area (Haq et al., 2003).

Formation	Lithology	Age
Alluvium and Piedmont Alluvium/ Colluvium	Alluvium is composed of light grey coloured, sand, silt, and clay. Piedmont deposit is comprised of light brownish grey to light greyish brown coloured, reworked Dupi-Tila sand.	Holocene
Sylhet Loess	Loess is formed of yellowish brown to light brownish yellow coloured, sand, silt, and clay.	
Rasulpur Clay Residuam Formation	Unconformity Red to dark reddish-brown coloured, mottled, sticky clay and clayey silt with concretionary bed at the top	Early-Middle Pleistocene?
Dupi Tila Formation	Unconformity Sandstone: wide variety of oxidized colour and fresh light grey to light greyish yellow tints. Alternation of sandstone and siltstone: Thinly laminated, grey coloured siltstone and light brown coloured sandstone (Base not found)	Plio-Pleistocene?

Description of the Formations

The Dupi Tila Formation is mostly composed of fresh light grey to light grey coloured loose and medium to very fine-grained sand of Plio-Pleistocene age. It also contained bluish grey coloured less sticky clay. Normally, this formation found in hill ranges where upper part is sandstone and lower part is claystone. From the lithological point of view sandstone member of the Dupi-Tila Formation have been divided into different units, such as sand unit and alternation of siltstone-sandstone unit. Siltstone-sandstone unit is the lower most unit, which conformably underlain by the sand unit. The laminated siltstone beds are grey coloured, often exhibits convolute and load cast structures. The sands are light brown to yellow coloured, fine grained and sometime cross laminated. The sandstone is hard but mildly cohesive sands. Pinkish grey, yellowish brown, reddish brown, greyish yellow, yellow coloured sand are generally oxidized.

Fine to medium grained, subangular to subrounded, well sorted sand is mainly composed of quartz with little mica, dark coloured minerals and partially decomposed feldspar. Numerous iron-crusts claystone and siltstone boulders and pebbles are found scatteredly in the sand unit.

The Rasulpur Clay Residuum is a unit of paleosoil, which overlies the sand unit of the Dupi-Tila Formation. The age of this formation is likely Early-Middle Pleistocene age and considered that the Dupi-Tila sands are weathered and altered to give rise to this thick residual clay deposits.

Sylhet loess unconformably overlies the Rasulpur Clay Residuum in the hill ranges. It is mainly composed of airborne fine sandy silt with significant amount of clay, which is characterized by slightly oxidized to unoxidized mature sediments.

Piedmont Alluvial/Colluvial deposits found along the foothills and valleys in-between the Tarap and Raghunandan hill ranges. The deposits are linear bodies and lying above the floodplain, which is sloping gradually away from the hills. Most of these sediments are come from by hill wash, so it may call reworked Dupi-Tila, which is being carried and deposited due to slope breaking.

Generalized Stratigraphy of the Study Area

The stratigraphy of the study area is described as three units and designated as Unit-I, Unit-II and Unit-III. These units were delineated based on the dominant lithology of the sediment deposits. Unit-III is in the Dupi Tila Formation of the Plio-Pleistocene age and the rest of the units are recent sediments of the Holocene age.

Table 2:- Generalized stratigraphic units of the study area, Madhabpur and Bahubal areas, Habiganj.

Units	Lithology	Thickness (m)
Unit-I	Silty clay, White clay/China clay	0.5 to 8.0
Unit-II	Peat, peaty clay, White clay/China clay	1.5 to 7.0
Unit-III	Unconformity Sticky clay, Sand and White Clay	7.0 to 8.0

Description of the Stratigraphic Units

Unit- III

Unit-III is the lowermost unit, which belongs to the Dupi Tila Formation. The unit is about 7 m below the surface, which is unconformably overlain by Unit-II. Generally, Unit- III is composed both of loose, water bearing sand and very light grey China clay/White clay layers. The sand is yellowish grey coloured, medium to fine grained, subangular to subrounded, moderately sorted and composed of about 80% quartz. Decomposed feldspar, mica, and few unidentified dark colour particles are also found. White Clay/China clay is very light grey colour, soapy to feel, slakes in water, moderately sticky and of low to medium plasticity. Few silt sized particles were observed in some places.

Unit-II

Unit-II contains peat and peaty clay which is unconformably overlies the Unit-III. The thickness of this unit varies from 1.5 m to 7.0 m. Little amount of white clay layer is also found in some places.

Unit-I

Unit-I is the uppermost unit and comprised of a thin silty clay layer at the top and 0.3-0.5 m below the ground surface. The colour of the layer varies considerably from hole to hole. Upper parts are brownish grey to yellowish grey and lower parts are light grey to very light grey colour. White clay/China clay is dominated in this unit. This unit is economically very important to commercially extract white clay.

Lithological Description of the Study Area

A number of hand auger boreholes (116) upto a depth of 10 m were done during two consecutive field sessions. Borehole lithologs (116) were prepared based on bore hole lithology. The lithologs reveal that under the surficial fine clastic deposits, a thin to thick bedded white clay layer is present. This is the white clay bearing layer that forms the main economic resource of the area.

Generally, the white clay layer is underlain by silty clay or peaty clay layers all over the area. At places, this layer is represented by white clay, sand or silty clay, which are localized in nature. The overall lithotypes in the study area are silty clay, white clay/China clay, sand, peaty clay, and peat. The spatial distribution of these lithologic units can be best demonstrated by three dimensional (3-D) subsurface model, cross-sections, and fence diagrams. A 3-D model a fence diagram were prepared as well as presented in Figure-6.

The 3-D models were prepared using the Rockworks 16 software to demonstrate the subsurface distribution of the lithotypes. The vertical scale of the model is exaggerated (approximately 100 times). The model shows that the top layer is dominated by silty clay. The middle layer is dominated by white clay. Some peat and peaty clay layers are also present in this layer. The peat layer is intercalated with some silt and silty clay layers at some places. The basal layer is dominated by sandy clay.

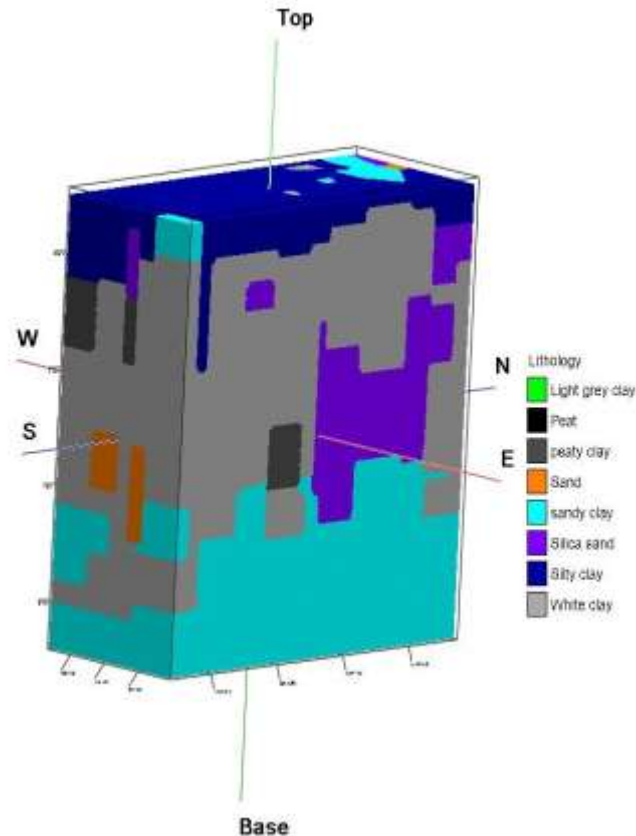


Figure-6. 3-dimensional view of underground layers in the area, Madhabpur, Habiganj District (vertical scale is exaggerated approximately 100 times).

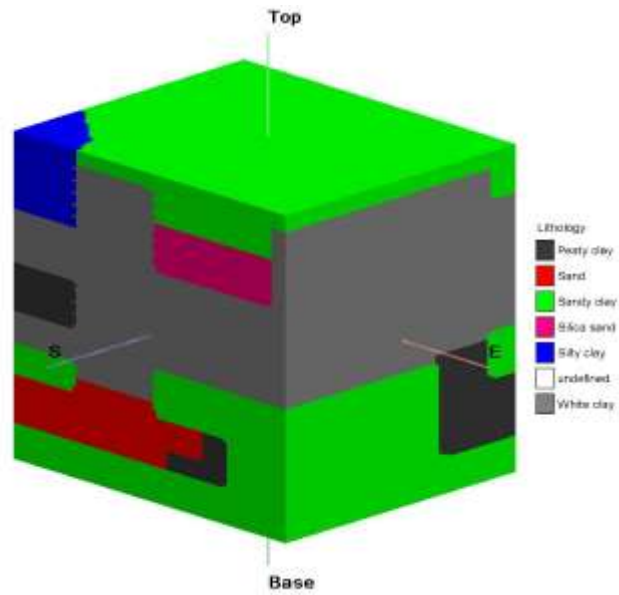
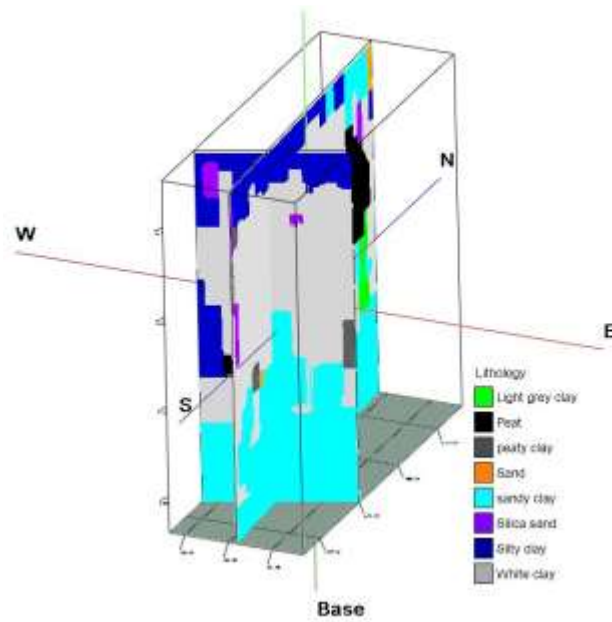


Figure-7: 3-dimensional view of underground layers in the study area, Bahubol, Habigonj district. (vertical scale exaggerated approximately 100 times).



direction).

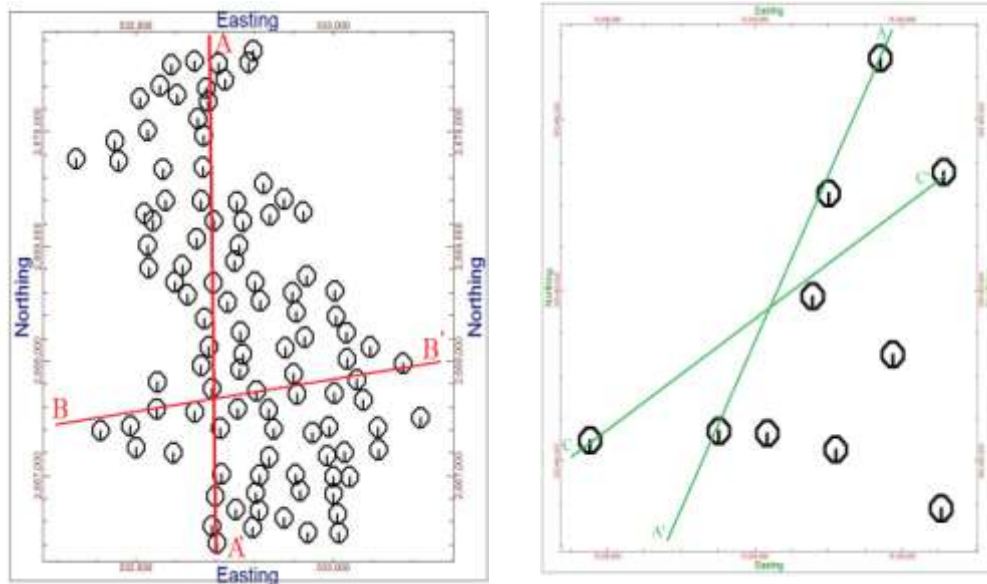


Figure 9: Profile map of the surveyed area, a) Madhabpur and b) Bahubol Upazila, respectively, Habigonj district.

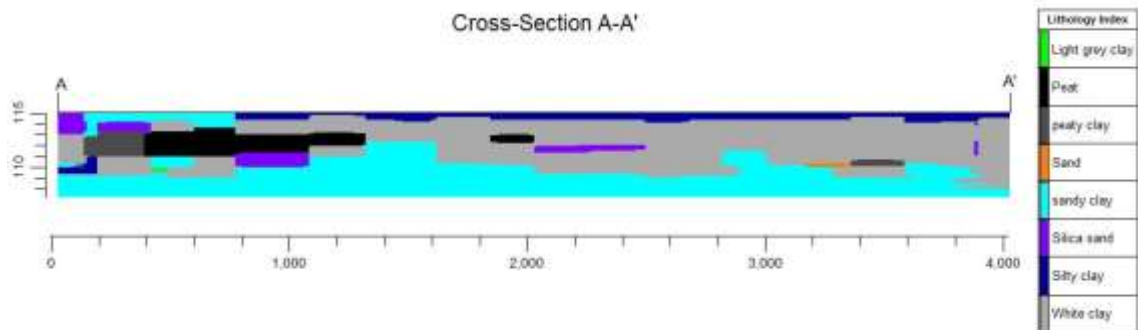


Figure 10: Cross-section along the line AA', Madhabpur area, Habigonj district (N-S direction).

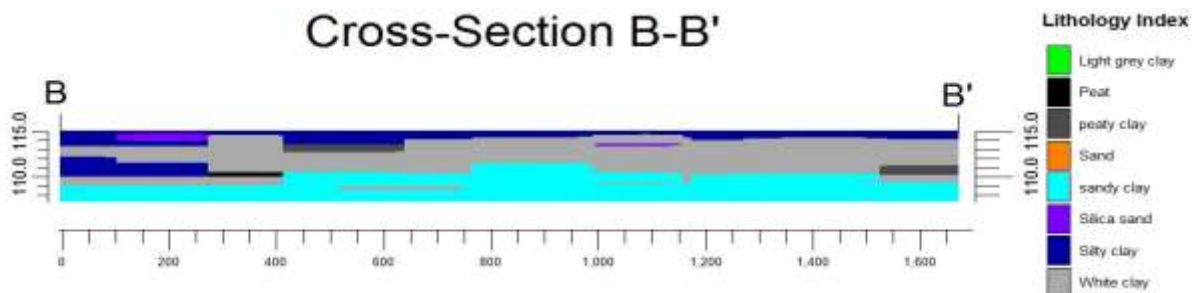


Figure 11: Cross-section along the line BB', Madhabpur area, Habigonj district (E-W direction).

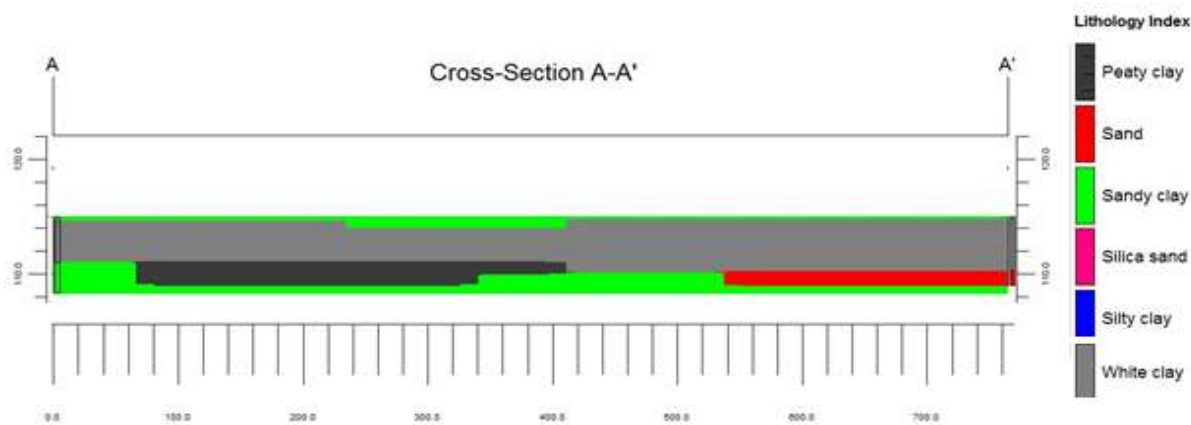


Figure 12: Cross-section along the line AA', Bahubol area, Habigonj, district (NE-SW direction).

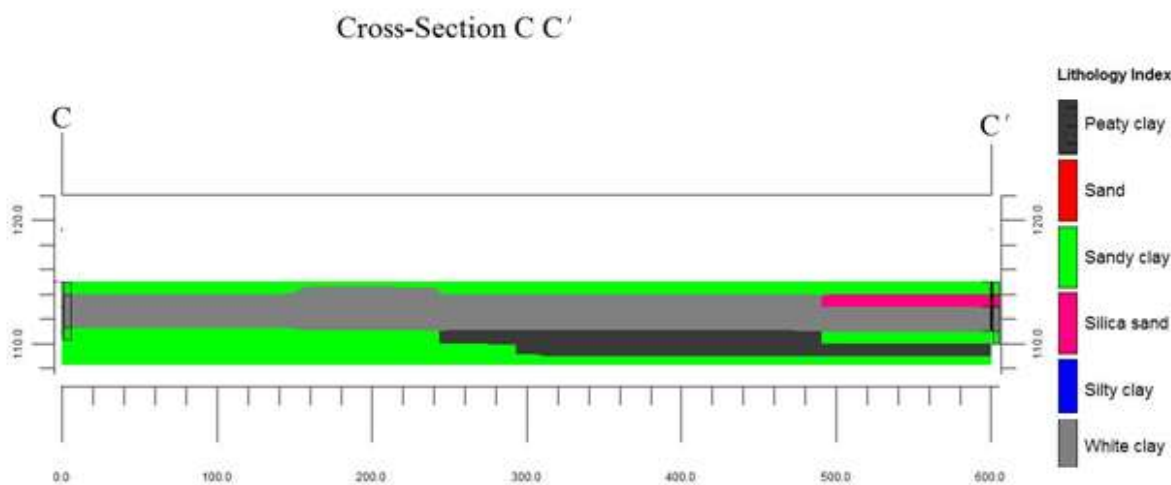


Figure 13: Cross-section along the line CC', Bahubol area, Habigonj district (NNE-SSW direction)

Finally, a fence-diagram (Figure-8) was prepared using the Rockworks 16 software, which shows the overall distribution of the sedimentary layers. The fence-diagram shows that the thickness of white clay/ China clay was highest in the southern part and decreases towards north and northwest. With the help of the diagrams the real position, areal and vertical extent of peat have clearly been known.

Paleo-Environment

The sediments of the Unit-III are very fresh with light grey to very light grey colour sand, and highly sticky clay. The sand is well sorted and contains trace amount of organic matter. The above characteristics may indicate a uniform environment of deposition in shallow to deep water lacustrine environment with little vegetal growth if at all. This environment might have persisted as a deep to shallow lake allowing fine grained sediments to be accumulated. The sediments of this unit may indicate the upper part of the deposit representing the last stage of lake sedimentation. At the end of the deposition of the unit the water depth might have been low enough to allow vegetal growth on top of the unit.

The Unit-II is dominated by peat deposit and overlies Unit-III. This unit may indicate that at the last stage of the filling up of the lake of Unit-III, the water of the lake was reduced and the lake bed got exposed for the most part.

The lacustrine environment gave way to a swampy environment of shallow water depth and lush vegetal growth. However, the dry peat and woody to twiggy matter in some places may indicate that the lake was entirely disappeared in that part.

After a period of vegetal growth, the swamp got totally destroyed by huge sediment influx, which forms the Unit-I of the lithologic succession on top of the peat deposit. This unit acted as an overburden on the Unit-II and transformed the vegetal matter into peat for the rest of the time up until now.

In summary, today all the paleo-environments persist at smaller scales and are localized in nature. For example, the whole area goes under water during the wet season and sometimes inundated by flash flood, which may represent the earliest stage of the paleo-environment. During the dry period, the area gets dry and vegetation exists, which may indicate the middle stage of paleo environment. The present environment is a complex of the earlier ones, which is well evidenced by its sediment content.

Formation of the White Clay

White clay/China clay occurs under a limited range of geologic conditions. The environments of formation include soil horizons, continental and marine sediments, geothermal fields, volcanic deposits, and weathering rock formations. Most of the clay form where rocks are in contact with water, air, or steam. Examples of these situations include weathering boulders on a hillside, sediments on sea or lake bottoms, deeply buried sediments containing pore water and rocks in contact with water heated by magma (molten rock). All these environments may cause the formation of white clay from preexisting rocks. Extensive alteration of rocks to clay minerals can produce relatively pure white clay.

According to Kessler (1951), the geological and chemical relationships of such deposits can be explained by assuming that the time of deposition, the shore line deposit consisted of feldspathic sands derived from a youthful piedmont surface level. The exposed sands were weathered and most of the feldspars were altered to kaolinite prior to and during the constant reworking of the sediments by the streams and distributaries draining the flat coastal area.

In the same way, a logical explanation for the mode of formation of the white clay of the studied areas may give two-phase theory. In first phase, the source rocks of the nearest Tripura hill ranges were weathered, transported and deposited as feldspathic sandstone surroundings the present deposition of white clay. The prevailing environment was fluvial channel and floodplain deposits.

In the second phase, sandstone was exposed and much of its feldspar content was weathered to the clay mineral (kaolinite). It is only natural to assume that some of the kaolinite along with other sediments were washed away during this time. At one stage a semiarid environment developed.

The lack of any organic matter in the white clay gives evidence to the semiarid environment. Much of the kaolinite was slowly transported, being separated from small pond like depressions. The presence of glass sand (Silica sand) in surrounding area shows that the separation of the less resistant contents of sandstone was taken place leaving behind the quartz grains.

After deposition of white clay, poorly drained local swamps developed in this area. A black clay band was deposited over the white clay during the time, which is high content of well preserved trees and wood debris is indicative of the poorly swamp environment. This event may be considered as the culmination of the second phase.

The white clay of the upper Dupi-Tila Formation was deposited in a similar way in isolated depression. They were subjected to a higher degree of weathering, which explains the absence of the black clay and presence of a lateritic band thicker than of the lower Dupi-Tila Formation.

The recent clay unit of the Holocene age including its white clay was deposited in calm and quiet water. The thickness of the clay unit indicates that the supply of sediments was high, and the basin was subsiding while deposition was taken place.

Economic Geology

Economic Aspects

The white clay/China Clay found in Madhabpur and Bahubal areas of Habiganj District is one of major deposits of white clay in Bangladesh. White clay is encountered at shallow depths (0.2 m to 4 m below the ground surface). Four more mouza of Madhabpur and one more mouza of Bahubal are the major white clay bearing areas, which are counted during the field investigation. The total reserve of white clay is about 70.8 million tons. This white clay may be used in different purposes. Most notable use is for ceramic industries, which may help to meet the current demand for ceramic accessories and to increase the economic growth of the country.

Physical and Chemical Characteristics of White Clay

The white clay of the study area is yellowish grey to light grey in coloured. It is highly compact in dry condition, but pasty in wet condition. The dry white clay is hard, soapy to feel, slakes in water, moderately sticky and plastic in nature.

Table 3:- Chemical composition of white clay.

GSB Lab no.	% of SiO ₂	% of Al ₂ O ₃	% of Fe ₂ O ₃	% of TiO ₂	% of MnO	% of CaO	% of MgO	% of Na ₂ O	% of K ₂ O	% of Loss on Ignition
4233/1	55.63	26.02	2.64	0.86	0.04	0.56	0.20	0.15	2.00	11.0
4233/2	60.50	21.77	3.96	0.82	0.08	0.84	0.40	0.15	1.80	9.20
4233/3	50.03	27.61	4.37	0.84	0.04	0.56	0.80	0.15	1.80	13.4
4233/4	50.95	27.78	4.03	0.86	0.05	0.28	1.40	0.15	2.00	12.0
4233/5	52.60	25.51	4.36	0.79	0.04	0.28	0.28	0.14	0.15	1.80

Analysed by Ahmed Ataul Muneem, Director (Chemistry), Chemical lab, GSB, Dhaka.

Reserve of White Clay

White clay reserve calculations of surveyed areas were done in five steps. Firstly, the thicknesses of white clay at different white clay bearing areas were measured with the help of augering (shallow drilling method). Secondly, the white clay bearing areas were identified and demarcated. Thirdly, the length, width, and thickness of white clay bearing area were calculated. Fourthly, the volumes of white clay bearing areas (Volume = Length x Width x thickness) were calculated. Finally, the reserve of white clay was calculated by multiplying the volume with the specific gravity of white clay (specific gravity of white clay is considered as 2.17) and summing up the products. In the Madhabpur area the average thickness of white clay is 4.0 m, and the average thickness of Bahubal area is 7 m. The Madhabpur area is about 10 km², whereas Bahubal area is about 0.5 km². The estimated reserve of Madhabpur area is 68 million ton and 2.8 million ton at Bahubal area. The total surveyed area is about 10.5 km². The total estimated white clay reserve of surveyed areas is about 70.8 million tons.

Uses of White Clay

There are many uses of white clay both home and abroad in different purposes, tremendous use in ceramic industries. Table wear, tiles, mosaic, and toilet accessories are made from white clay. Some electrical tools are also made from this white clay. Very poor quality of white clay can be used in brick industries.

Discussion of the White Clay:-

The white clay bearing area of Bahubal is located eastern part of Dhaka-Sylhet national highway and northern side of Bahubal Upazila Town. The area comprises of Shibai mouza under the union of Shatkahon Union Parishad. Ten (10) auger /shallow boring holes were drilled in the Bahubal area (0.5 km²) during the field investigation. White clay are randomly found at 0.2 to .3 m below the surface. The maximum thickness of this clay is about 5 m. The white clay is characterized by thickly bedded (more than 4.0 m), yellowish grey coloured, moderately sticky and soapy to feel, slakes in water.

Most of the white clay deposits are in the Madhabpur area under the mouza of Shompodhpur, Ratanpur, Surma and Vandaure. The area is comprised of plain lands, agricultural lands, streams, and channels. These areas are in the eastern side of Dhaka-Sylhet national highway near the Shahpur railway station. Raghunandan Hill Range is in the eastern part of the area. One hundred six (106) auger /shallow boring holes were drilled in the Madhabpur area

during the field investigation, which covers an area of about 10 km². The minimum thickness of white clay encountered is 3 m in the peripheral zone and the maximum thickness is 8 meter in the area of Vandaura mouza near the Shahpur Railway station. The white clay is characterized by thinly to thickly bedded (3 m to 8 m), upper part yellowish grey but lower part light grey to very light grey coloured, moderately sticky and soapy to feel, slakes in water. The investigated area sometimes inundated during the rainy season but flash flood is very common in this region, which caused by heavy rainfall in the adjacent hilly areas.

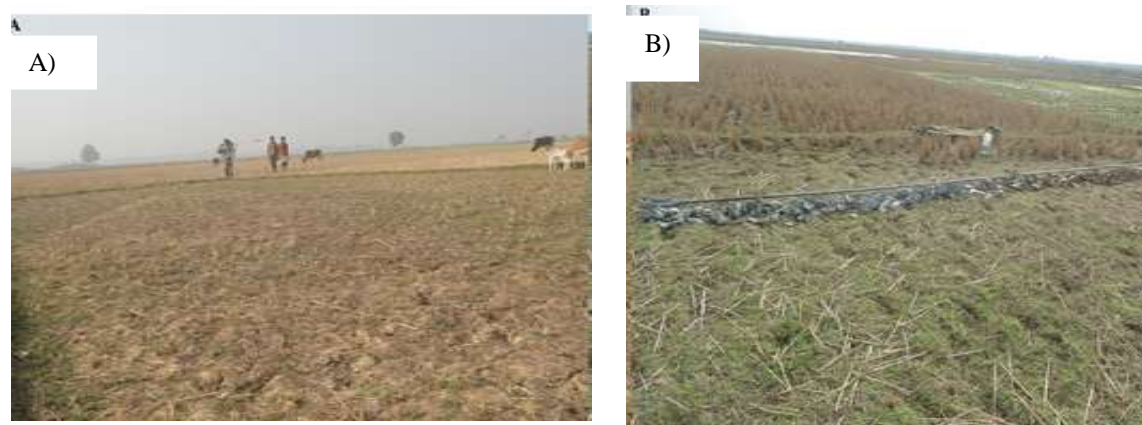


Plate 2 : A) White clay/China clay dominant area and B) White clay/China clay dominant area as well as orientation of White clay after augering, Madhabpur and Bahubol area, Habigonj district.



Plate 3:- The close view of White clay/China clay, Habigonj district.

Mining Potentiality

Mining Aspects

White clay is randomly found near the ground surface of the study area. White clay deposit area is well communicated and easily accessible by both metaled and non-metaled/semi-metaled road. The white clay bearing areas are mostly agricultural lands with little human settlement. Mining is the important part of any economic deposits. There is no legal quarry lease/ mining lease activity in the surveyed areas but little illegal extraction is still going on, which was observed during the field investigation. Based on white clay deposits, many ceramic industries developed in this region. Therefore, it is one of the most important issues that white clay mining should be set up according to the mines and minerals rules of Bangladesh. If the proper system applied to the activities of white clay mining, government may earn significant amount of revenue from white clay.

Mining Method

As the white clay occurs in the study area near the ground surface with a thin overburden of only 0.5 to 3.0 m thickness, the most suitable mining method for extracting the white clay would be opencast mining. Excavator or manually digging methods can be applied for the extraction of this deposit. Firstly, remove the overburden from areas of the white clay, secondly, cutting the white clay and finally preserve in nearby suitable places. After removing white clay, the area exists 5-8 m below the mean sea level. Therefore, the depressed areas must be needed to fill using sands, so that it can be reused for agriculture. On the other hand, after removing the clay, the area can be used for fishing.

Environmental Impacts of White Clay Mining

In addition to the demolition of the natural white clay, land ecosystem and other environmental issues can be caused by extraction. During the mining of white clay surrounding environment may be affected by landslide, water logging, etc. Therefore, environmental impact assessment (EIA) is required before the mining of this deposit.

Conclusions And Recommendations:-

Based on the surveyed information of white clay /China clay exploration of Madhabpur and Bahubal area of Habiganj Districts, the following conclusions and recommendations are made.

1. The white clay of the investigated area is of moderate to good quality according to the results on physical and chemical properties of the white clay.
2. The reserve of white clay of Madhabpur area is about 68 million tons and Bahubal area is about 2.8 million tons.
3. The white clay may be mined by using excavator or manually digging.
4. This white clay /China clay may be used for different purposes, especially in ceramic industries.
5. A proper planning for land use, environmental management and policy should be taken before extraction of white clay /China clay.
6. Mining of white clay /China clay must be in such ways that prevents every kind of environmental hazards.
7. Before extraction of white clay /China clay, detailed feasibility study must be needed in order to ensure sustainable and environment friendly operation.

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