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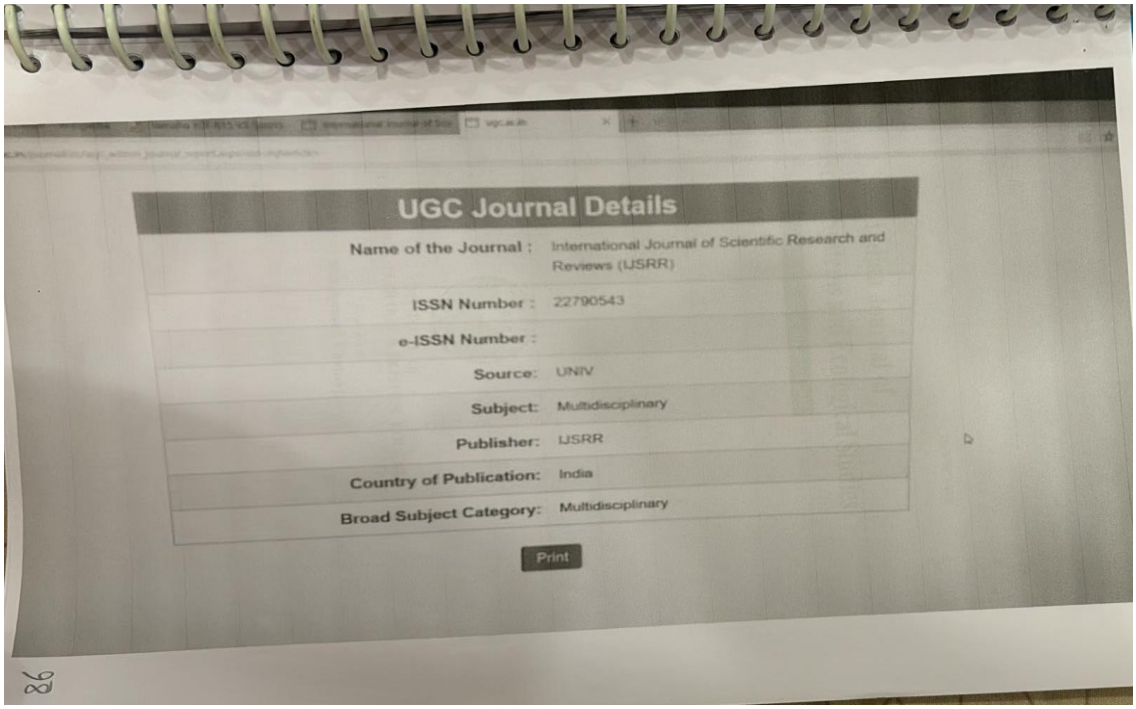

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Environmental Degradation Due to Jeans Factories at Chatta Kalikapur Area in Thakurpukur-Maheshtala Block of South 24 Paraganas, West Bengal.

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ABSTRACT

Environmental degradation is the deterioration of environmental quality through depletion of earth's resources such as air, water, soil and land. The entire textile industry is very destructive to our planet. Especially the Jeans industry is the worst, as the chemicals used to create colours are the most harmful to our environment. Chatta-Kalikapur in South 24 Parganas District of West Bengal is one of the main garments areas in Thakurpukur-Maheshtala area and has been chosen to study the problems of environmental degradation especially land and water pollution emanating from the Jeans factories. Being the part of South 24 Parganas district of West Bengal the study area is predominantly agricultural areas but the clustering of Jean's factories in Chatta-Kalikapur area have been destroying the agricultural lands. Moreover, the factories use huge groundwater resource which also results in the lowering of the water level in the entire area and the local Government is not taking any initiative to protect all these resources. If proper actions could not be taken immediately the whole land will be barren and canals will be chocked forever. The aim of this paper is to find out the problems emanating from the Jeans Factories and also suggest remedial measures for the sustainable development of Jeans Factories.

KEYWORDS: Environmental degradation, pollution, toxic chemicals.

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INTRODUCTION

Environmental degradation is one of the most vulnerable problems in the modern world. Environmental degradation is the deterioration of environmental quality through depletion of earth's resources such as air, water, soil and land[3]. The entire textile industry is extremely destructive to our planet. Especially the Jeans industry is the worst, as the chemicals used to create colours are very much harmful to our environment[8]. India is a big market with a lot of potential for the jeans industry despite the fact that the industry has been growing robustly over the past few years. For a majority of the Indian youth, jeans are not just a casual wear, but more of a fashion statement. Almost 85% of the market is dominated by men, with a 10% contribution from the female segment and the kid's segment contributing about 5% of the market[4]. Chemicals such as cadmium, mercury and lead are used to make a pair of jeans and the destruction of these chemicals in the environment especially into water and soil make our environment very much polluted and vulnerable[2]. Nearly twenty thousand people do not have direct access to clean water in the study area and we are further polluting our natural resources for creating fashion. Booming of Jeans export accelerates the production of jeans world wide[9].

Chatta-Kalikapur area in South 24 Parganas District of West Bengal is one of the main garments area especially Jeans in Thakurpukur-Maheshtala area which is also an accelerated industry based on demand at national scale and has been chosen to study the problems of environmental degradation emanating from the Jeans factories. Small to medium-sized factories are mainly clustered in Chatta-Kalikapur area in Chalki para and Karbala and Akan Para areas and some factories are also found in Molla Para, Ghughu Para, Raipur and Lalpol area. The growth of the Jeans factories has been taken place at a very faster rate in the last ten to fifteen years and the local people work in the factories. There is a very high steep gradient which implies that the number of jeans factories are increasing at a faster rate in the current years in the study area (Figure:2).

The owners of the factories import cotton from Punjab- Gujrat Ahmedabad region and they manufacture Jeans in this area and sell it in the wholesale local market of Metiabruz area and Haora Market and also other areas of West Bengal. These Jeans factories are non-registered and unauthorized and do not pay any tax to the Government but are solely responsible for making the environment in the study area very much vulnerable due to a high level of water and soil pollution. It is not only lowering the environmental quality but also playing a very positive role in destroying the agricultural lands at an alarming rate.

Moreover, the entire study area has an acute shortage of drinking water as the Jeans Factories uses a lot of water for washing purposes and they draw huge groundwater from the underground aquifer for this purposes. As the study area comes under Panchayat so this area does not get surface water. People have to depend on Groundwater for drinking and household purposes. All the waterbodies mainly pond and canal in the study area are chocked heavily due to the dumping of waste products and chemicals from factories. These are all creating severe problems in Chatta-Maheshtala area. The local government is not taking any initiative to protect land and water from pollution and conserve ground water resource. This paper aims to study the problems emanating from the jeans factories in the study area and also suggest the sustainable development of Jeans Factories.

II. LOCATION OF STUDY AREA: Chatta area of Thakurpukur–Maheshtala block of South 24 Paraganas district has faced the problems of water and soil pollution due to the uses of harmful chemicals in jeans factories in this area in last 15 years. Chatta Kalikapur is one of the main garments area in Thakurpukur-Maheshtala area which is located at 22°26′03″N 88°17′03″E / 22° 26' 3.11"°N 88° 17' 2.66"E and bounded by Barisha in the north, parts of Behala and Sonarpur in the east, Bishnupur I and Bishnupur II CD Blocks in the south and Budge Budge I in the west has the highest number (Figure:1). It has an area of 63.08 km^2 and has six-gram panchayats amongst Chatta–Kalikapur is one of them with census population 24,985 (Census, 2011).

III. PROBLEMS OF THE STUDY AREA: Chatta-Kalikapur area is the main garments especially the Jeans producing areas in Thakurpukur-Maheshtala area. The environmental impact of jeans is quite high. In every stage of the production, there is quite a heavy environmental burden. Jeans factories use a huge amount of toxic and harmful chemical substances and also release hazardous metals like Chromium, Iron, Manganese, Copper, Lead, and Cadmium. (Figure: 3a & 3b). The factory uses solid chemicals in jeans manufacturing and washing processes. There mainly five solid chemicals are used like Salt, Silicon, Sapna, Soda & Colours during its production. Salt is the highest (43%) & followed by the Colour (32%), Soda (10%), Silicon (8%), Sapna (7%) in the factories. Moreover, factories also use other toxic chemicals like hypo, Acetic acid, Hydrogen, Softner, Deanimis and Dinis. The release of these toxic chemicals into the nearby canal make the canal water highly polluted which adversely affect the agricultural activities in the area. These chemicals are not treated by the Jeans factories before releasing into the nearby canal[5]. During monsoon months when canal water over flooded and it pours all its water with these toxic chemicals into the surrounding land and make the agricultural land very much unproductive and barren. Water

tests in the canal show that level of pH in canal water is quite low i.e below 7 in this region. Dumping of waste materials from factories and throwing out toxic chemicals from factories into the canal is very much detrimental to the environment[6].

Jeans factories need average 1500 gallons of water to produce one pair of Jeans and in Chatta–Kalikapur areas uses a lot of water which is usually drawn from nearby underground deep tube wells. High withdrawn from groundwater from underground aquifer creates a shortage of drinking water during summer time. All these factors invite many environmental problems which make the entire study area very much vulnerable. This area is very much in a critical situation and needs preventive measures to stop water and soil pollution and encourage the local people for of sustainable jeans factories in this locality.

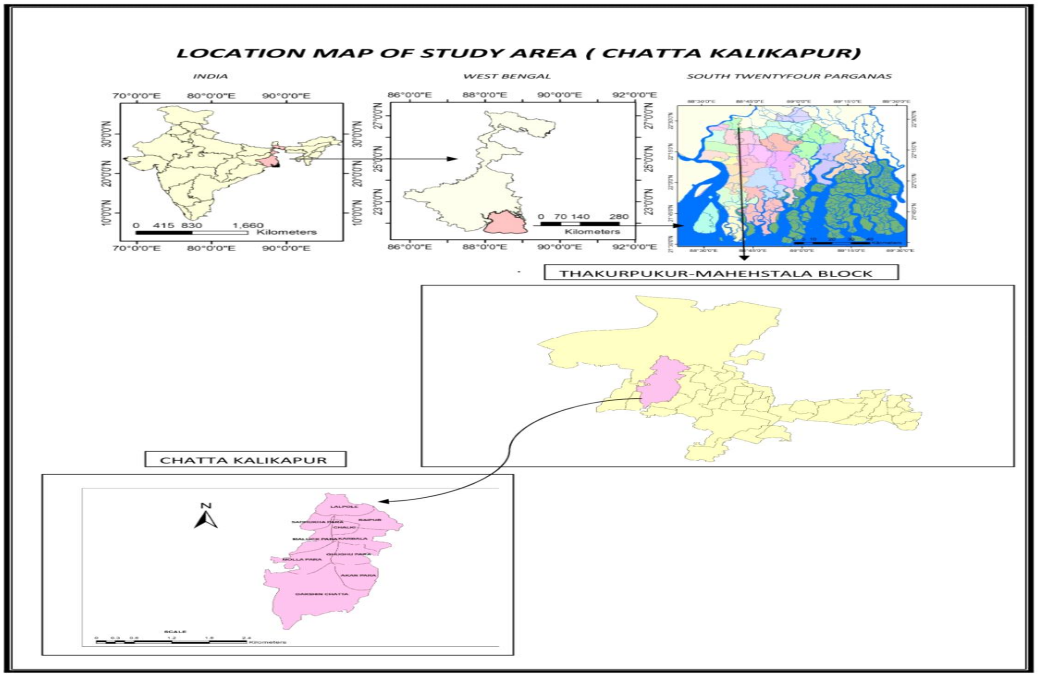

Figure 1Location map of the study area.

IV. OBJECTIVES AND METHODOLOGY

To have a proper idea about the development of Jeans Factories in the study area and its impact on the surrounding areas includes the following objectives

- To analyze the different issues and concerns which are related to jeans factories in the area.
- To identify the problems and prospects regarding the study area and to find out the role of these factories in lowering environmental degradation.

- To assess the existing water quality in the canal and to assess the degradation level of local water bodies and its impact in reducing agricultural activities in the study area.
- To find out the causes and extent of soil or land degradation and its role in deteriorating agricultural activities.
- To find out the remedial measures to prevent water and soil degradation and sustainable development of Jean's industries in the study area.

This study is basically descriptive in nature and based on the secondary and primary information. Both qualitative and quantitative methods have been applied for execution of study in Jeans Factories in Chatta-Kalikapur areas. The present research work is based on the application of modern as well as a conventional methodology with intensive fieldwork. The analytical part of the research is based on the compilation of various secondary data and also analysis of primary data from field visits to fulfil the objective. Secondary data obtained from Government offices, panchayat offices, archival sources, downloaded information through websites, and the suggestions and recommendations made by the interviewing the workers are very resourceful to assess the research problems. Nearly sixty Jeans factories were surveyed in Chatta- Maheshtala area and a questionnaire survey was carried out and interviewing the factory workers were conducted to study problems of the study area. The whole study report is prepared on the basis of primary data. All the data are collected by primary survey with help of random sampling techniques. After the collection of data, it has been analyzed with the help of some statistical and quantitative techniques. The nature of the present research work is explorative and the whole work has been done by descriptive as well as analytical methods.

V. RESULTS AND DISCUSSIONS: Clean water and soil resource are both essential to the planet's ecosystems and fundamental to people's wellbeing[3]. It is a basic human right but it is the most threatened essential resource in the study area. Securing clean water for current and future generations are essential for the ecosystems and human societies alike. The Jeans factories in the study area use different solid chemicals during jeans manufacturing and washing processes. There mainly five solid chemicals used like Salt, Silicon, Sapna, Soda & Colours during Jean's production. Here, Sodium hypochlorite is used in bleaching and Potassium Permanganate are sprayed to discharge the indigo, producing a vintage effect. All these factories in Chatta- Kalikapur areas release these toxic chemicals during its manufacturing processes into the canal without any treatment and make the water in the canal and the soil acidic. Acidic water in canal decreases the availability of nutrients in the water and does not support its water for crop production.

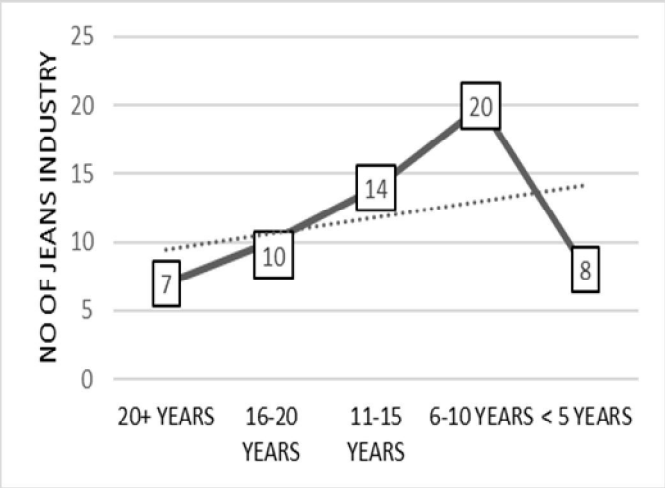

Figure 2 The trend of Jeans factory establishment.

The amount of released wastewater in Karbala is less than 1500 litters but in Akan Para and Dakshin Chatta, the wash factory releases the wastewater more than 1500 litters to 3000 litters. The disposal of water effluent in the canal is quite high and it chocks the water flow through the canal. Dakshin Chatta has very severe water pollution (76%) followed by Chalki Para, Ghughu Para & Molla Para. The entire industry is extremely destructive to the study area. The dumping of wastewater and harmful chemicals like cadmium, mercury and lead into waterways nearby make the study area very much polluted and vulnerable.

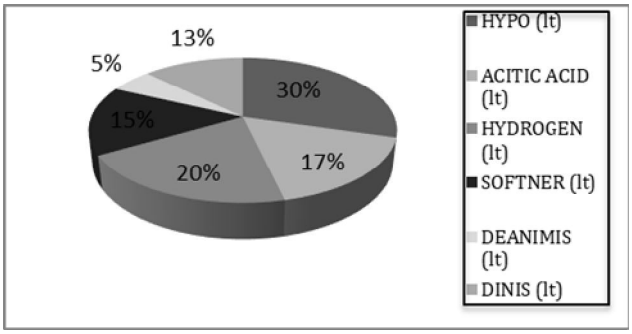

Figure 3a Proportion of different liquid chemicals used in wash factory

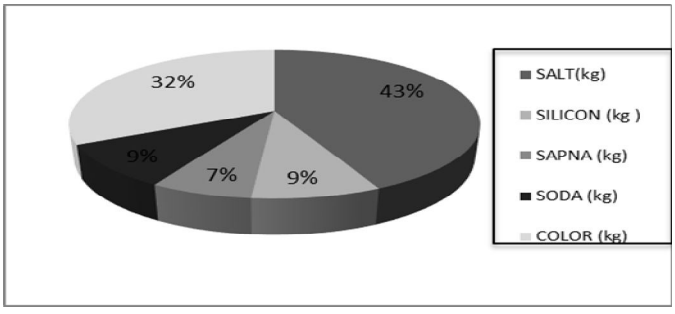

Figure 3bThe proportion of different solid chemicals used in wash factory

The level of soil pollution is also very alarming in Chatta- Kalikapur areas due to jeans industries. High soil polluted areas are Dakshin Chatta & Akan Para. Lalpole is the least polluted part of Chatta Kalikapur areas. Pollutants released by the jeans industry are continuously doing unimaginable harm to the environment. It pollutes land and makes them useless and barren in the long run[11]. Jean's manufacturing units release hazardous wastes into the nearby land. Results indicated all the metals like Chromium, Iron, Manganese, Copper, Lead, and Cadmium were present in amounts larger than that prescribed as unsafe by World Health Organization (WHO) in the solid wastes. They can cause many problems in living beings.

The Figure 4a shows the water pollution rate in the different places in the study area which depicts that water pollution is highest in Dakshin Chatta followed by Chalki Para, Karbala, Mallick Para. The pH of natural water values around 7. Here different samples of water from nearby canal & ponds of Chatta Kalikapur areas were taken into water testing laboratories and found Dakshin Chatta in canal pH is 6.23 and in the pond, it is 6.28. In Karbala, the pH in the canal is 6.67 and in the pond, it is 6.69. In Mollick para the pH in pond is 6.78, Raipur pond—6.84, Lalpole (pond—6.94), Ghughu para (canal—6.58, pond—7.05), Akan para (canal—6.29, pond—6.85), Sadhukha para (pond—7.10), Molla para (canal—6.3, pond—6.85), Chalki para (canal—6.6, pond—6.79). The pH of water in the canal and ponds are highly acidic in almost all the areas of Dakshin Chatta because of the release of a high amount of chemicals from wash factories.

The Figure 4b shows the pH level of soil in different areas. In the diagram the pH value is mainly differ from 6.4 to 7.4. In Dakshin Chatta, the soil pH value is lowest that means the soil is more acidic in this area, and value is highest in Mollick para and Lalpol, where the pH value is 7.2 to 7.4, which indicates the soil of the area is neither alkaline nor acidic. Most of the surveyed areas of the study areas have acidic soil due to use of the acidic chemical in wash factories. It indirectly induces soil more vulnerable to soil structure decline and erosion. The process of soil acidification is a serious land degradation issue. Without treatment, soil acidification has a major impact on agricultural productivity and sustainable farming systems in the study area.

The Figure 4c is showing the amount of TDS in water in the different area of Chatta Kalikapur areas around Jean's factories. In Molla Para, the amount of TDS in water is highest and Sadhukha Para is lowest. The value mainly differs from 0.5 to 4. So we can say that the highest amount of TDS occurs in Akan Para, Molla Para, Chatta, Ghughu para due to high industrial activities.

The Figure 4d is showing the amount of phosphate in water in the different area. In south Chatta, the amount of phosphate in water is highest and in Akanpara it is lowest. The value mainly differs from 0.4 to 2.5. So we can say that the highest amount of phosphate occurs in Dakshin Chatta

due to high industrial activities. Phosphorus is an essential element for plant life, but when there is too much of it in water, it can speed up eutrophication (a reduction in dissolved oxygen in water bodies caused by an increase of mineral and organic nutrients) of rivers and lakes. This has been a very serious problem in the study area and to become highly eutrophic ("enriched"). A sign of this is excess algae in the canal and in pond water.

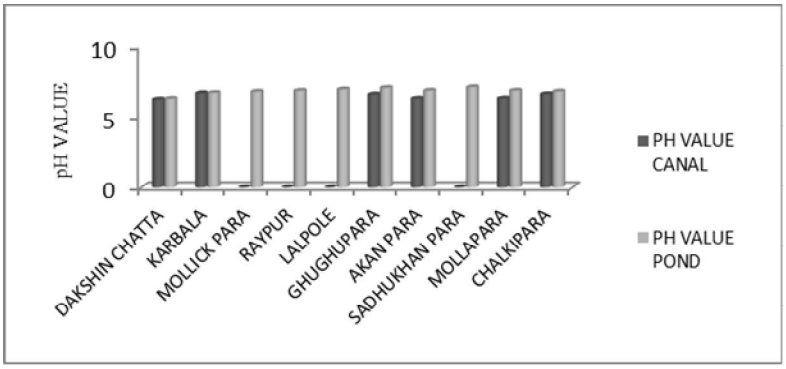

Figure 4a

pH value of water

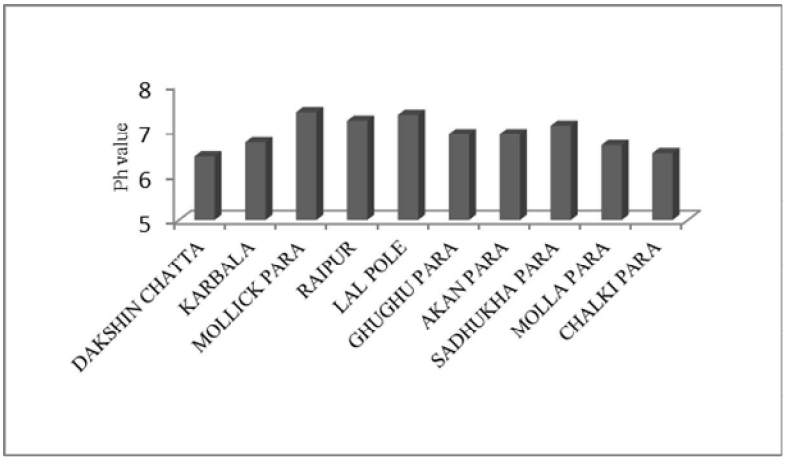

Figure 4b

pH value of soil

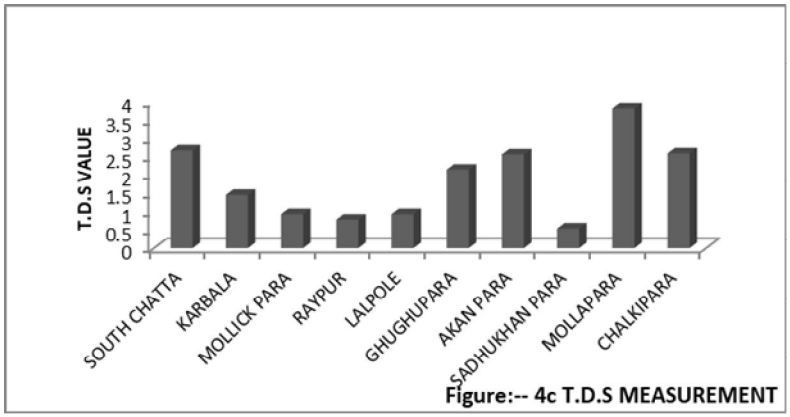

Figure 4c T.D.S measurement

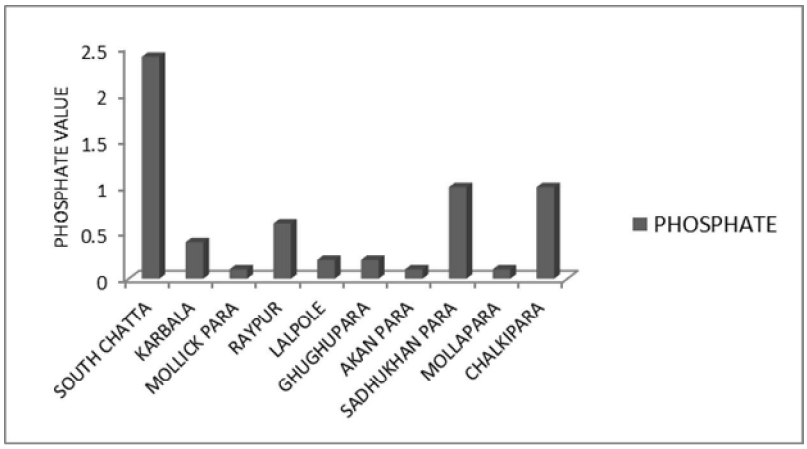

Figure 4d Phosphate measurement

Jeans industry is one of the uprising industry in the garment sector and the study area has very high prospects in the upliftment of the economy of the Thakurpukur-Maheshtala areas due to fast growing of jeans and wash industries and employment generation, but there is a severe environmental damage occurred due to this. Being the part of South 24 Parganas, the study area is predominantly agricultural areas as it is lying between the marine-riverine delta in the north and the marine delta zone in the south. As the sea receded southwards, a large low lying plain got exposed. Both tidal inflows and the rivers have been depositing sediments in this plain and form huge agricultural land in South 24 Parganas and also in the study area. As non-saline water for irrigation is scarce, agriculture is monsoon dominated in the study area. Agriculture is the main occupation of the people till the later part of the twentieth century but now agricultural activities in Chatta- Kalikapur areas has been totally stopped due to a high level of water and soil pollution which plays a very positive role in reducing the agricultural activities

Most of the jeans factories have been established between 10 to 15 years ago. The Jeans factories in the study area use different solid toxic chemicals and liquid chemicals during jeans

manufacturing and washing processes. All these chemicals are thrown in canal water without any filtration and treatment and make the water in the canal and the soil acidic. This toxic water in the canal also decreases the availability of nutrients in the water and does not support crop production. The level of pH, TDS, and phosphates in canal water are quite high in Chatta- Kalikapur areas in comparison to surrounding areas and create severe problems for agriculture. The solid chemicals are also dumped from factories into the nearby land and canal side which have chocked the flow of the water in the canal heavily. Moreover, spill over the canal toxic water into the agricultural land during monsoon time make the land toxic, useless, barren and unproductive. All these factors led to the cultivation of crops unfavourable.

Earlier most of the lands in these areas were agricultural land but now people are retreating themselves from agricultural activities to work in Jean's industries due to high and stable income. Agricultural activities are very much hampered as most of the people of Chalki Para, Karbala and Ghughu Para are engaged with jeans industries. The Jeans manufacturing units also need a lot of workers for processing of jeans. In large factories, nearly 200-300 workers need to work and small factories need 30 to 80 workers. Even the wash factories need many people to work. So people are more interested to engage themselves to work in jeans Factories rather than work in the agricultural land. The shortage of Agricultural Workers in the study due to Jeans Factories has incorporated declining trend of agricultural activities.

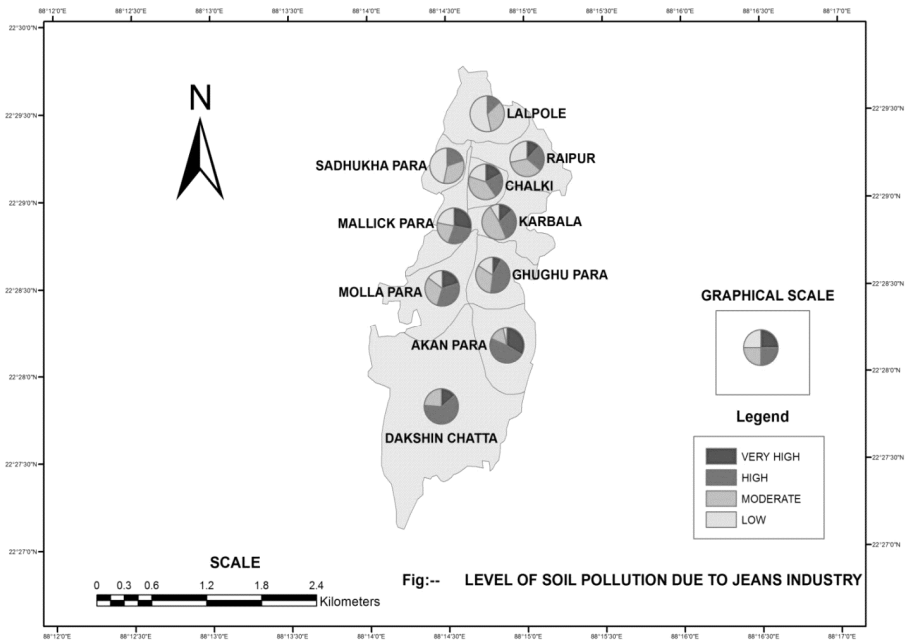

Figure 6 Level of Soil pollution

Moreover, the Jeans factories in Chatta-Kalikapur area demand huge quantities of water which are drawn from deep tube wells in the area for washing and manufacturing processes. Jeans manufacturing needs several times of wash so water is one of the essential parts of manufacturing and washing of Jeans[10]. Tremendous uses of groundwater for factories make the area shortage of drinking water during summer time. Due to unplanned utilizations, heavy-duty tube wells and hand pumps have been installed haphazardly as per requirement without giving any consideration to the potentiality of the aquifers. Amount of groundwater withdrawn is quite high over 5000 litres/day by a large Jeans factory. There are nearly sixty to seventy factories in the area and all of them use groundwater for a manufacturing process which creates a scarcity of water for crop production and drinking water in the entire study area. Water scarcity during summer and winter time is also a very severe problem in the area which doesn't allow to practise agricultural activities.

Plate 1 Water pollution due to the addition of chemical water to the canals.

Plate 2 Shallowing of canals due to plastic pollution and absence of dredging.

VI. SUGGESTIONS: Jeans manufactures in Chatta- Kalikapur areas dump huge amounts of harmful chemicals such as cadmium, mercury and leads into the canal. These chemicals have a negative impact on the environment as well as on the quality of water which plays a positive role in declining the agricultural activities in the study area. Distressed denim, a popular trend in the last several years poses different threats to the environment. The distressed look of jeans requires multiple treatments, which further causes negative impacts on the environment as the repeated washing of the jeans results in the continuous introduction of dangerous chemicals in the water supply of that area4. After analysing the primary data collected from the study area we can conclude that the agricultural system and waterbodies especially the canal are completely degraded due to this jeans factory which are unauthorized and unregistered. There are no proper government actions taken to protect this environmental damage. The state government and Panchayat must look into the industry for further growth and local people should be more aware and take immediate actions for the development of agriculture, as well as the ecosystem of the entire area.

The industrial activity in the study area is spreading fast towards the rural areas and diminishes the agricultural capability of the land which should be controlled by proper mitigation and may check the occupational loss of the farmers. The farmers should be encouraged to practice both industrial and agricultural activities. Financial assistance from the local governments will be helpful for carrying out agricultural practice.

This industry demands a lot of water for repeated washing of Jeans and energy to run machines. Solar Energy plant should be set up by the local government for conservation of energy which will bring sustainable development to the Industry. For washing of Jeans, factories use huge groundwater from the underground aquifer. This creates a severe water crisis in the area. Jeans manufacture draw groundwater for washing of jeans which results in lowering of groundwater level in the study area. This sweet water aquifer should be protected for future needs. Due to the critical groundwater condition in the study area indiscriminate withdrawal of groundwater is to be restricted. If necessary, the area is to be notified by legal means. Emphasis is to be given to lower the stress on groundwater development by covering more and more area under pipe water supply (treated surface water) by the local government. Regular monitoring of both groundwater level and quality of groundwater is to be done. This will help to understand the change in piezometric surface consequent to the withdrawal of groundwater and the change in the quality of groundwater.

There is only one canal which flows through the region and plays an important role during monsoon months but the heavy siltation of the canal due to the dumping of industrial wastes from Jean's factories has resulted in waterlogging problem during monsoon months. All the adjacent agricultural lands are covered with these toxic water during monsoon months and pose serious

threats to both our precious ecosystems and to human health. The urgent and transparent action is needed in order to eliminate the use and release of these hazardous chemicals. It must be stopped immediately and waste products should not be thrown into the canal. Canal should be taken care off by the local Panchayat Government. Otherwise, in the rainy months, the entire areas will be flooded and the industry will suffer a lot.

Road condition must be improved as all the roads in the study area are not well connected to the wash factories that create major problems for quick transportation of the Jeans. Sustainability of Jean's factories requires that human activity only uses nature's resources at a rate at which they can be replenished naturally. The study area is having many serious consequences of such successful Jeans industries and the following recommendations will be helpful for long-term development of the Jeans industry.

- Proper registration of these Jeans Industries may ensure the health and life of the labourers by ESI scheme.
- The agricultural activity should be encouraged with industrial activity as a result, the presence of both industry and agriculture may generate a stable economic condition in the area. Financial support for agricultural activities should be invoked.
- Proper dredging of the canals should initiate by the govt. to maintain the regional drainage system.
- Proper use of filters at the wash plants should mandatory for the environment[1]. Clean water discharge from the plants may reduce the soil and water pollution.
- EIA and EMP guidelines should be maintained by the factories and Environmental audit are must for this Jeans industries.
- Environmental awareness programme among the local people will be helpful for understanding the role of nature and human activity[7].

VIII. CONCLUSIONS: The Jeans Factories in the study area play a major role in generating income and employment in the entire region of Maheshtala areas of Thakurpukur and it has very immense prospects in the upliftment of the economic condition of the people living in this area. This region also attracts the workers from outside West Bengal mainly from Bihar, Uttar Pradesh and Delhi but on the other side, the jeans industries pose serious threats to the environment and solely responsible for water and soil pollution in the region. All these environmental pollution lead to the deterioration of agricultural activities and water shortage. So the sustainable development of Jeans Factories is very much appreciable so that the environmental damage should be minimized.

The agricultural lands must be protected for crop cultivation, chemicals used in the Jeans Factories should not be thrown directly into the canal without filtration and treatment, canal must be dredged so that it can carry enough water during monsoon months and uncontrolled withdrawal of groundwater for jeans wash should be monitored. Agricultural activities are also encouraged among the local people with the industrial development so the entire region will have immense potential for the development of the economy of West Bengal.

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