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RESEARCH ARTICLE

EFFECTS OF ENVIRONMENTAL POLLUTION ON LIVELIHOOD IN THE RIVERBANK REGIONS OF BARISHAL CITY CORPORATION

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Abstract

This research has focused on several unwanted effects of environmental pollution on the riverbank residents of Barishal city corporation. Precisely, this survey-based study has focused on the effects of air, water, soil, and noise pollution on human life of riverbank inhabitants. Sixty-three respondents were chosen from nine wards of the riverbank areas for interview using a purposive sampling method. The analyzed data indicated that environmental pollution has severe effects on human life. The result shows these pollutions intensify several diseases such as physical and mental disorders, eye inflammation, noses, and throat irritation, soreness of the respiratory tract, asthma, cancer and chronic pulmonary diseases in this area. Besides, the waste and pollutants in this riverbank area causing fatal ecological destruction, migration of people, change of landscape, and such pollution also creating a threat to global warming and ozone layer depletion. The haphazard management of waste disposal systems, cement industries, chemical industries, shops, markets in this area, and urban waste wreak havoc in this area. Because of the cripple destruction nature, city corporation authorities are not yet concerned about the destructive forces and future threat of environmental degradation. The findings of this research will give some essential grounds to take into account for policymakers and stakeholders for making an effective future action plan.

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Introduction:-

Environmental pollution is one of the hardest challenges that the world has to contend with today. It commenced in the time of the 18th-century industrial revolution, growing gradually with devastating effects and triggering irreversible impairment to the world. Climate change is very likely to be in the nastiest situation within the next decade. The term "**climate emergency**" observed a 100-times surge in its usage. So, it was labelled as the term of the year 2019 by the Dictionary of Oxford. According to the definition of Oxford, a **climate emergency** is "a context in which quick action is needed to abate or halt climate change and turn away from potentially irreversible environmental damage resulting from it" (Ghosh, 2018). The Scenario of Barishal city is not different. The people in this area are in the grip of severe environmental degradation.

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Every other day new factories and industries are being set up, new vehicles come on roads, and trees are cut to make way for new homes and infrastructure. The cultivating land in Barishal city corporation area is now rare. Especially the riverbank area is facing its greatest catastrophe of the age. A large number of people in this area are under threat. For the lack of proper initiatives, awareness, and policies from the government and authorities, they are facing severe environmental racism. Brulle and Pellow (2006) defined **Environmental racism** as the form which shows harmful wastes and additional contaminants are unreasonably found in marginal and underprivileged localities, an outline with clear health consequences. Oil refineries, chemical plants, toxic dumps, garbage incinerators, power plants, shipbuilding industries, and other environmentally unsafe installations are more likely to be built near poor communities in the riverbank area. All these are happening, because disadvantaged people are often politically frail to resist such facilities, and some may even appreciate the jobs created by the power users. Due to lack of sufficient system for waste treatment, all produced wastes are falling directly into the river. They use the river as the only dreadful medium for industrial pollutants and anthropogenic waste. Especially those who live in this area are creating more considerable damage than others. Pollution can be specified as follows - the presence of an unusually high concentration of harmful substances or radioactivity in the environment as a consequence of human activity or natural processes such as volcanic eruption or the unwanted presence of noise or artificial light (Collin, 2004, p.167). Environmental problem is not always a scientific problem. A myriad of social matters and terms like social organizations, set of regulations, collection of beliefs, the inability of governmental policies, laws to regulate pollutions, social forces, human decision making, and social structure directly or indirectly influence the environmental problems. In most of the context, we give priority in profit-making and other social phenomena over ecological interest (King and McCarthy, 2009). The outnumbered collection of groundwater causes a massive drop in the groundwater level of Barishal city. Between the last three or four years, the groundwater level falls approximately 15 feet every summer (Swapan, 2019). Besides that, the BOD (Biochemical Oxygen Demand) is too far from the required level 6. It was 2.45 in the dry season (Dry: November-April) and 2.07 in the wet season (Wet: May-October) in 2015 (Ahmed, Ali, and Mustari, 2016). From the WHO air quality database, the mean concentration of PM_{2.5} (particulate matter) and PM₁₀ in 2015 for Barishal City were respectively 80 and 113 measured by (The Ministry of Environment and Forest, Clean air, and sustainable environment). It was higher than in all other cities in Bangladesh (WHO, 2018). Many spots of riverbank area are becoming the centre of tourist attractions, where the shops and market are acting as abominable sources of pollution. A case in point is 30 Godown. The owners of these shops and markets only care for the profit, not the environment. Thus, most of them are polluting their surroundings unconsciously. The launch terminal area is also becoming vulnerable to the river ecology. A large number of organic and non-organic constituents and most of all necessary goods from the capital (Dhaka) are received from here. However, there is no ecological friendly system to maintain the download of these goods, especially putrescent materials. So, the scums and residue of these constituents find their way to the river. This study tried to depict the miserable scenario of environmental degradation in the riverbank area of Kirtonkhola river in Barishal city corporation, Bangladesh.

Literature Review:-

A breathtaking view was stated in 1992 by Ulrich Beck investigated by (Freudenburg 1997) "in a risk society, hazard does not arise from technological accidents alone. The heightened risk occurs due to intensifying environmental threats. Environmental hazards are more extensive, prolonged, and ambiguous than technological catastrophes". "Now, we are living in "Risk Society." We are facing our most significant hazard for thousands of years. "Climate Change" A tacit assumption by Serena (2019) is that Climate change was something that scientists had anticipated that would occur in the future. More significant storms, higher floods, more great heat waves, extreme sea level rises, all of these are taking place far more quickly than many of us thought conceivable. Scientists all over the globe are in no doubt that at the current rate of warming, we risk a shocking future. For a better future, we need Sustainability. Nevertheless, it is lamented by Andersen, Taylor, and Logio (2017, p.393), "Sustainability has been changed into an organizing cry, a cry for new social policies that will defend the Earth's environment and the people who live within it. Can we gain Sustainability? It is now news of gloom and doom due to environmental pollution. We may think that the term environmental pollutions are solely the work of science. However, social issues are just as central to understanding the ecological problem and its effects.

Rahman's study (2006) would seek to analyze the effects of coastal pollutions and mentioned eye irritation, nose and throat irritation, irritation in the respiratory tract, chronic pulmonary diseases, bronchitis, asthma, cancer, silicosis, asbestosis, and hearing are the result from pollution. He further showed the effects of pollutions are changed in biodiversity, coastal inhabitants lost, low economic outcomes, change of landscape, deforestation, waterlogging, vast migration of people, destroying the ecology in the Sunder ban. Alam (2009), and Khan and Ghouri (2011)

emphasized that environmental pollution causes different types of health hazards in the form of air, water, soil, and sound pollution. Alam (2009) showed that air pollution causes a headache, vertigo, burning sensation of eyes, sneezing, nausea, tiredness, cough, bronchitis, asthma. Siddique (2019) addressed that, Barisal scores 274 in the AQI (Air Quality Index), was tagged as 'very distasteful'. The US Environmental Protection Agency (EPA) established the AQI for showing the condition of air quality. "Air Quality Index" is the measurement of particulate matter in the air. The emission of PM_{2.5} and PM₁₀, Ozone (O₃), Nitrogen Dioxide (NO₂), Carbon Monoxide (CO), Sulfur Dioxide (SO₂), are recorded to measure AQI. According to Siddique (2019) among the leading ten causes of death in Bangladesh, most of them lung cancer (13%), lower respiratory infections (7%), chronic obstructive pulmonary disease (7%), ischemic heart disease (6%), and stroke (5%) are linked to air pollution. Usually, the level of air pollution deteriorates in the dry months from October to April when insufficient rainfall makes matters worse. According to the National Institute of Diseases of Chest and Hospital (NIDCH), nearly seven million people in Bangladesh be burdened with asthma over half of them children. Alam (2009) further concluded that noise pollution is the main ecological pollutions of Bangladesh but a neglected issue throughout Bangladesh. Noise pollution causes deafness, heart attack, blood pressure, tachycardia, headache, and peptic ulcer. Peirce, Veiling, and Weiner (1997) state that only loud and sudden sound can damage the eardrum. Hearing ability reduces as an effect of ageing called presbycusis. Noise also affects the other bodily function, including the cardiovascular system, rhythm of the heartbeat, thickening the blood, dilating blood vessels, and extending eye difficulties. Steffan et al. (2018) demonstrate the effects of soil pollution on human health through ingestion, respiration, and skin penetration of Lead, Arsenic, Cadmium, Nitrate, Mercury, Radionuclides, and Xenobiotic organic chemical. Lead causes lead poisoning. Radionuclides Radon causes lung cancer, genetic mutation, and methemoglobin prevents oxygen-carrying throughout the body. Chinwe (2013), in his study, was to verify the problems associated with the refuse disposal. Waste from our dumpsite affects the personal life and environmental health of inhabitants. The toxic effects of pesticide poisoning result from headaches, dizziness, nausea, vomiting, respiratory distress, and eye burn. Kaly (2004) illustrated that most of the cities and coastal settlements of Bangladesh do not have any kind of waste treatment facilities. Domestic wastes (mostly sewage) directly or indirectly find their way into rivers and the sea, because two-thirds of the area of the country is connected to the Bay of Bengal via rivers. Sankoh (2013) showed that remote and close residents suffer from many diseases due to the location of their dumpsite closer to their settlement. In dry season people living far away from the dump face air pollution caused by the waste from their dumpsite. Payandehnik (2014), in his study, showed that pollution disturbs both mental and physical health, and can strengthen mental disorders, including sleep disorders, aggression, depression, anxiety, and somatic symptoms. Pollution is the principal cause of physical illness, including allergy, bronchitis, asthma, food poisoning, typhoid, worms, parasitic diseases, Helicobacter pylori. Hasan, Shahriar, and Jim (2019) mentioned that bacteriological contamination is also a terrific source of surface water pollution, which causes warnings to both urban and rural people. Haseena et al. (2017) identified that typhoid, cholera, encephalitis, poliomyelitis, hepatitis, skin infection, and gastrointestinal are bacterial, viral, and parasitic diseases transfuse through contaminated water. Hasan, Shahriar, and Jim (2019) again mentioned Cholera, typhoid, polio, ascariasis, cryptosporidiosis, diarrheal diseases, attenuation of the bowels, and polio are the consequences of pollution Ahmad, Khan, and Haque (2018) showed the fault in the diagnosis of arsenicosis in Bangladesh with the classical signs. However, deep down, it paves the way to cancer without showing any short-term exposure. So, from all perspectives, environmental pollution just has a negative side for the human being.

Methodology:-

Research Type and Design:

The quantitative research approach was employed in this study. The survey format was considered to generate quantitative information.

Study Setting:

Barisal City Corporation has thirty wards. However, among them, nine wards are located close to the river area. In these specific areas, from the bulk of male and female adults, we have collected data from available respondents.

Sample Frame, Sample Size, Sample Technique:

The population for this study comprises of all people who are living in this riverbank area. However, it is not possible to draw exact representative samples from this significant population due to limited time, shortage of workforce, financial constraints, and logistic support. Therefore, we have carried out a purposive sampling technique. Sixty-three samples from these nine wards were selected randomly, ensuring each of the neighbourhoods contains seven respondents.

Data Collection Instrument:

The sample of the coastal inhabitants and employees was surveyed through the questionnaire. A self-completion questionnaire was given to the sample groups. The questionnaire was designed to gather information about their surrounding daily activities, interactions with the river, the knowledge about the environment and pollution, ideographic background, and misery of the pollution they were facing. The questionnaire was in a self-completion format with the presence of the researcher. It was apparent that some of the respondents were unable to understand as they are not from a strong academic background. In that case, he/she was interviewed or helped by the researcher. The questionnaire was piloted in every chosen ward.

Findings:

The following study finding will let us understand the diverse effects of pollution in riverbank areas of Barishal city corporation.

Table 1. The rate of respondents who know about what environmental pollution is:

Awareness	Frequency, N	Percentage
Yes	56	88.9
No	7	11.1
Total	63	100.0

Source: (Field survey, 2019).

The above table shows that among the 63 inhabitants, 56 number of respondents know what environmental pollution is. The percentage is 89%. Just seven inhabitants do not have any proper idea about environment pollution.

Table 2. The effects of river water pollution on human health:

Effect on Human Health	Frequency, N	Percentage
Eye Inflammation	19	21.3%
Nose and Throat annoyance	20	22.5%
Soreness of the Respiratory tract	17	19.1%
Facing Odour nuisance for Ammonia, Sulphur dioxide, Nitrogen oxide gases	9	10.1%
Cuff and Sneeze by the Attack from, caused by particulates (pollens)	6	6.7%
Chronic pulmonary Illness Bronchitis, Asthma	15	16.9%
Causing of Cancer by carcinogenic agents	3	3.4%
Total	89	100.0%

Source: (Field survey, 2019).

Above table shows the highest number of respondents are suffering from nose and throat annoyance which comprises 22.5%. Eye inflammation and inflammation of the respiratory tract are also in severe position. 21.3% of respondents are suffering from this problem. The soreness of the respiratory tract is 19.1%. Carcinogenic agents are the lowest in rate, which stands 3.4% of the total respondents. Dey and Islam (2015) stated that about two-thirds of diseases are related to water-borne conditions in Bangladesh. About 17% of respondents suffer from chronic pulmonary diseases.

Table 3. Types of industries polluting the environment in Barishal city corporation:

Types of Industries	Frequency, N	Percentage
Chemical Industries	41	30.8%
Ship Building Industries	36	27.1%

Cement Industries	15	11.3%
Waste from hospital	15	11.3%
Shops or market on the bank of the River	21	15.8%
Brick kilns Industries	5	3.8%
Total	133	100.0%

Source: (Field survey, 2019).

Here chemical industries are high in rate, which comprises 30.8%. As it is the famous route of the south and coastal area of the country, the shipbuilding industries are rising. They are the sources of sound, soil, water pollutions. Furthermore, the exciting matter is all most all shipbuilding industries are very close and near to the riverbank area. According to Amin, Chowdhury, and Islam, (2018), among 69 shipyards, approximately 4% of shipbuilding industries are in Barisal division. Due to the change in trends by major shipbuilding countries like China, Korea, from small ocean-faring vessel to large, Bangladesh, and other third world countries like India are taking advantages of it. However, most of them are not environment friendly (Amin, Chowdhury, & Islam, 2018). The cause of their placement at the riverbank area is the advantages of carrying them quickly to the river that saves a large amount of money. Shops and the market on the riverbank are additional sources of pollution which comprise 15.8%. The dark side about the owner of shops and the markets is that most of them are not aware of environmental pollution. To them, business interest is the most valuable thing. Waste from hospital and cement industries hold the same position for polluting the environment. All the cement industries are very close to this river which playing as point-source pollution.

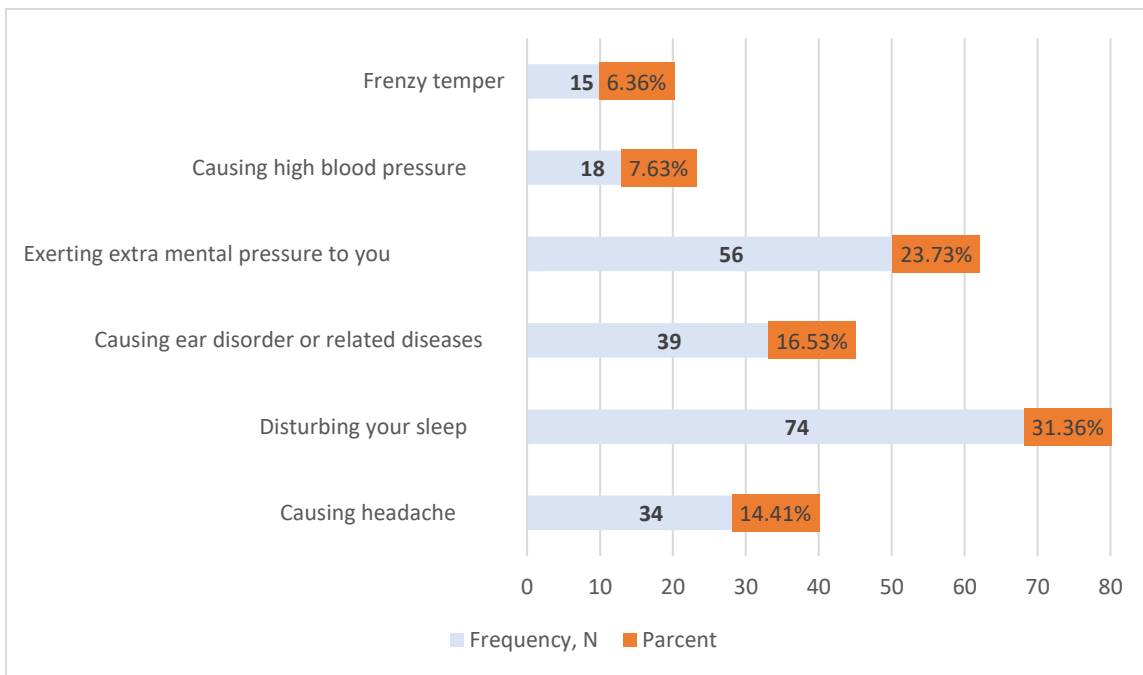


Figure 1. Effects of noise pollution (Field Survey, 2019).

Mostly the noise from vessels disturbs the people in the riverbank area. 31.36% of respondents said that loud noise from the vessels disrupts their sleep. 23.73% thought the extra sound from vessels causes extra mental pressure on them. Noise can pave the way to blood pressure (Münzel and Sørensen, 2017). 16% have ear-related illnesses. About 7% think their cause of blood pressure is due to the excessive sound. About 14% of respondents think they suffer from a headache due to the noisy sound. So, this area is in the severe threat of sound pollution. This condition of excess sound silently destroys the hearing organ of the riverbank inhabitants. Day by day, they become accustomed to it. As WHO (2018) puts it, the number of people with hearing loss increases in Bangladesh from 9.5 million in 2008 to 12 million in 2018. It should not be taken for granted. The number related to the hearing loss will be increased abundantly within the next decade.

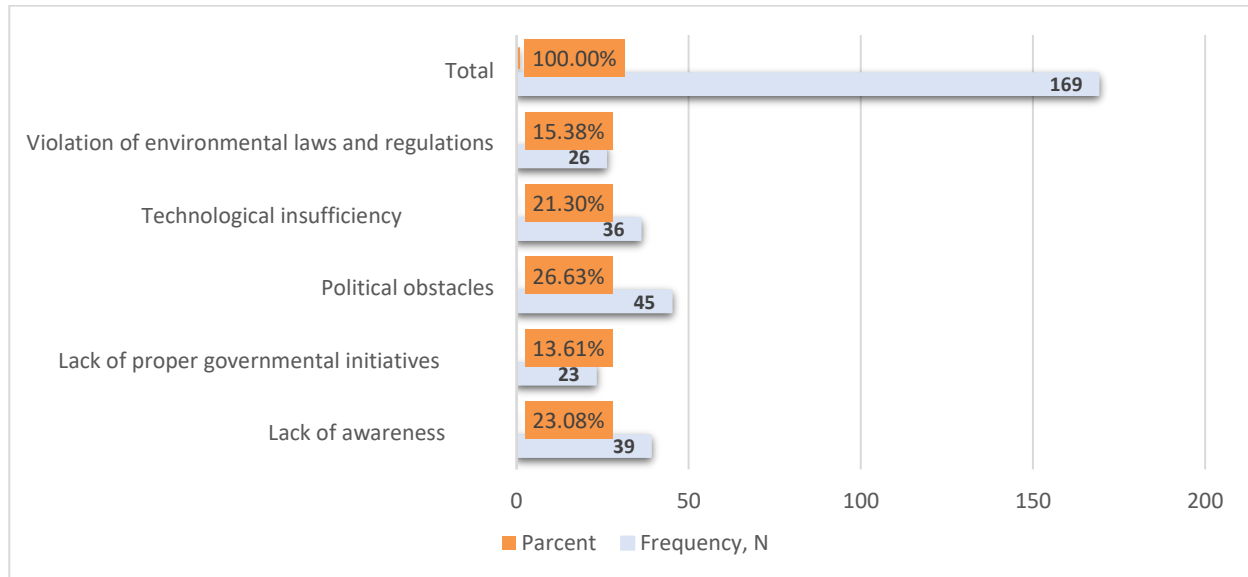


Figure 2. Significant barriers to pollution reduction (Field Survey, 2019).

Above figure shows that 26.63% of riverbank inhabitants think political obstacles are the root cause of pollution. The frequency for this option is 45. Due to the lack of collaboration among political parties, environmental interests are taken for granted. 23.08% of respondents said that the lack of awareness is liable for pollution. Even the environmentalist is not working eagerly here in the riverbank area. The riverbank inhabitants have no proper idea about environmental pollution. Therefore, this area needs to arrange the awareness-raising program in no time. It may come in useful for pollution reduction. 21% of respondents think we have technological insufficiency, and 15% said we violate environmental law. When they were asked what environmental law is, they could not answer. 13% of respondents think the government is not responding with their best efforts.

Result and Discussion:-

Environmental pollution has no benefit for human beings. It can just enhance misery to human life. Ecological degradation causes significant damage in this area. However, its progress is plodding; we are still not aware of the future threat of pollution in this area. Many diseases are creating a vulnerable situation for riverbank inhabitants. Extra nutrients and contaminates will make the water unusable shortly. In the winter season, riverbank inhabitants suffer for the decreased level of river water. Waterlogging, deforestation, and the transition into the industrial area from the residential area are frequent. A large number of people banished due to environmental degradation. The riverbank area is losing its conditions of living so rapidly. Due to transport benefits, this massive amount of industries is established in this riverbank area of Barishal city corporation. Nevertheless, they violate environmental laws and do not care for environmental safety. This condition cannot be changed for political intervention as the respondents of this region think so. The owners of these industries are powerful enough to assert a force against the environmental authorities. Sometimes, it seems they pose strong political affiliation. Besides that, this riverbank area is prone to environmental racism. Due to their rare participation in mainstream society, especially the launch terminal area, they cannot raise their voice against influential. Air pollutants emitted from the large commercial vessels and the pollutants from ships and launch are discharged into the river directly without any accountability. The organizations that work for the environment protection visit this area once in a while. They are not active enough to raise awareness or apply action to reduce pollution. The intensity of noise is extremely high. It is unbearable for the riverbank inhabitants. A large number of people do not know about several terms and its relevant environmental information. However, people are hoping for constructive changes in the coming days. Through the proper initiatives, awareness-raising programs, and individual and institutional, it may be possible to solve environmental barriers in this region.

Conclusion:-

To reduce pollution and make the environment pollutants free is not just one person's work. It is a massive task for all of us today. We have now started to face the belligerent phase of climate change and the disruptive form of

environmental pollution. So, we are too late to solve this burden. Still, we have a remedy. People are coming forward to participating in ecological movements. Greta Thunberg was nominated for Nobel Prize this year, being a young environment-activist. However, pollution and climate are still harsh, and a dire threat to countless people. Anti-climate activities may provide some opportunities, but by avoiding such ferocity actions, in the long-run, it can enhance more excellent and diverse benefits with some catastrophic surprise. This study identified agricultural land; the means of natural livelihood is dislocated on which thousands rely for essential elements of living. New types of diseases and bugs becoming common in this area. Due to the poor economic condition, the riverbank inhabitants remain in the most vulnerable situation. Their environmental problem is not just their problem. If we cannot stop pollution in this area, then it will spread rapidly from this riverbank area to the whole city of Barishal. However, the outcome of reducing pollution-related initiatives will result very slowly. So, we must wait with forbearance and work as much as we can do with environmental ethics. Although it is not an easy task, our small participation can pave the way for the reduction of environmental pollution. The sources of polluting industries in this area are immediately needed to be brought under control to save the environment from pollution.

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