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RESEARCH ARTICLE

A PANDEMIC SITUATION AND POSITIVE IMPACT ON ENVIRONMENT IN 21ST CENTURY: A CASE STUDY IN CITY OF NATURE, WEST BENGAL, INDIA

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Abstract

Microorganisms are minuscule living things that are seen surrounding us and areas too little to even consider being seen by the unaided eye. They live in water, soil, and the air. All are a piece of Biodiversity that are living in our biological home of Earth. A few microorganisms make us wiped out, others are significant for our wellbeing. These are minuscule living things that are answerable for infections, for example, toxoplasmosis, jungle fever, AIDS, and distinctive influenza. In the 21ST Century, at end of 2019, they presented another infection whose name is Novel Corona Virus COVID-19. People may have almost no invulnerability against another infection. As indicated by the WHO, a pandemic includes the overall spread of another illness. While a scourge stays restricted to one city, local, or country, a pandemic spreads past public boundaries and perhaps around the world. On the off chance that a disease gets inescapable in a few nations simultaneously, it might transform into a pandemic. Hence, Policymakers and Governments of a few nations are concluded that the Lockdown strategy to take to quit blending the human body and transaction. As result, Transports, Industries, Business centers, Education establishments, Offices are lockdown for a very long time to a quarter of a year world insightful in a few nations additionally our country India. For the present circumstance, we have seen the contamination of our current circumstance is incredibly limited; about 60% to 70% is decreased. The Jhargram town of West Bengal in India is a district town of South Bengal which is located under the forest area. That town is Green and Clean which is known as the City of Nature. By the inquiry, I have observed that CO_2, CO, and Dust particles are decreased, the other hand O_2 and RH of all air quality elements are increased during the lockdown. Pre Lockdown(Normal situation), in April 2019, I have recorded that the density of CO_2 in-town atmosphere is about 420ppm to 620ppm, the amount of CO is about 12 to 14ppm, and the amount of O_2 is about 20.80%. Another hand, during the Lockdown on 24th April 2020, I have recorded that the density of CO2isabout 340ppm to 345ppm, CO is about 5ppm and the amount of O_2 is about 21.50 % to 21.60%. As result, the air quality of the town is highly hospitable and healthy for the Human body. Not only the improvement of air quality but also minimizedthe daily uses of

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Water. By the inquiry, I have measured that about 50% to 60% dailyuses of water is reduced in the town, as results little rise of underground water which rate is 1.5 to 2 feet. Finally, I have expressed that, Pandemic situation by a microbe Novel Corona Virus COVID-19 is positively influenced by environment quality as well as tocreate a Green and Healthy ecological home for the inhabitant.

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Introduction:-

In the 21ST Century, from the finish of 2019, they presented another infection whose name is Novel Corona Virus COVID-19. People may have next to zero invulnerability against another infection. Regularly, another infection can't spread among creatures and individuals. **(R, 2007)** Occasional flu (influenza) pestilences, by and large, happen because of the subtypes of an infection that is now flowing among individuals. Novel subtypes, then again, for the most part, cause pandemics. **(Aahil, 2020)** These subtypes won't already have coursed among people. A pandemic influences a higher number of individuals and can be more lethal than a plague. It can likewise prompt more social disturbance, financial misfortune, and general difficulty on a more extensive scale However, on the off chance that the illness changes or transforms, it might begin to spread effectively, and a pandemic may result. As indicated by the WHO, a pandemic includes the overall spread of another infection.**(medical news today, n.d**.) While a plague stays restricted to one city, area, or country, a pandemic spreads past public boundaries and potentially around the world. Specialists believe an illness to be a scourge when the quantity of individuals with the disease is higher than the gauge number inside a particular district. If a disease gets broad in a few nations simultaneously, it might transform into a pandemic. Thus, Policymakers and Governments of a few nations are concluded that the Lockdown strategy takes to quit blending the human body and social separating. As result, Transports, Industries, Business center points, Education foundations, Offices are lockdown for a very long time to a quarter of a year world shrewd in a few nations additionally our homeland India. For the present circumstance, we have seen the contamination of our current circumstance is incredibly limited; about 60% to 70% is decreased. **(World Health Orgnization , n.d.)** The Jhargram town of West Bengal in India is a locale town of South Bengal which is situated under the backwoods territory. That town is Green and Clean which is known as the City of Nature. By the request and field review with the assistance of various contamination estimating instrument for Pre lockdown in of April 2020 and during the lockdown, I have seen that CO2, CO, and Dust particles are diminished other hands O2 and RH of all air quality components are expanded during the lockdown in April 2020. At last, I have communicated that Pandemic circumstance by a microorganism Novel Corona Virus COVID-19 is emphatically impacted by climate quality just as to make a Green and Healthy environmental home for the occupant.

Location and Identification:

The Jhargram town, West Bengal in India is a regional town of South Bengal which is situated under the Sal thick deciduous timberland region. That town is Green and clean which is known as the City of Nature likewise famous name is 'Aranya Sunday'. It is augmentation lies between $86^0 59' 42'' E$ in the west to $87^0 1' 15'' E$ in the east and $22^0 25' 06''$ N in the South to 22^0 28′ 55″N in the north. It is set up in 1982 and comprises of 18wards which distance from the capital of Kolkata is around 180 km and passes the South Eastern Railways that the Kharagpur – Tata segment in the town. Jhargram town is situated on the Howrah-Mumbai railroad line and 155Km away from Kolkata and just 20 km away from the line of Jharkhand State and 15Km away from N.H.- 6, known as AH – 46. **(JHARGRAM, n.d.)**

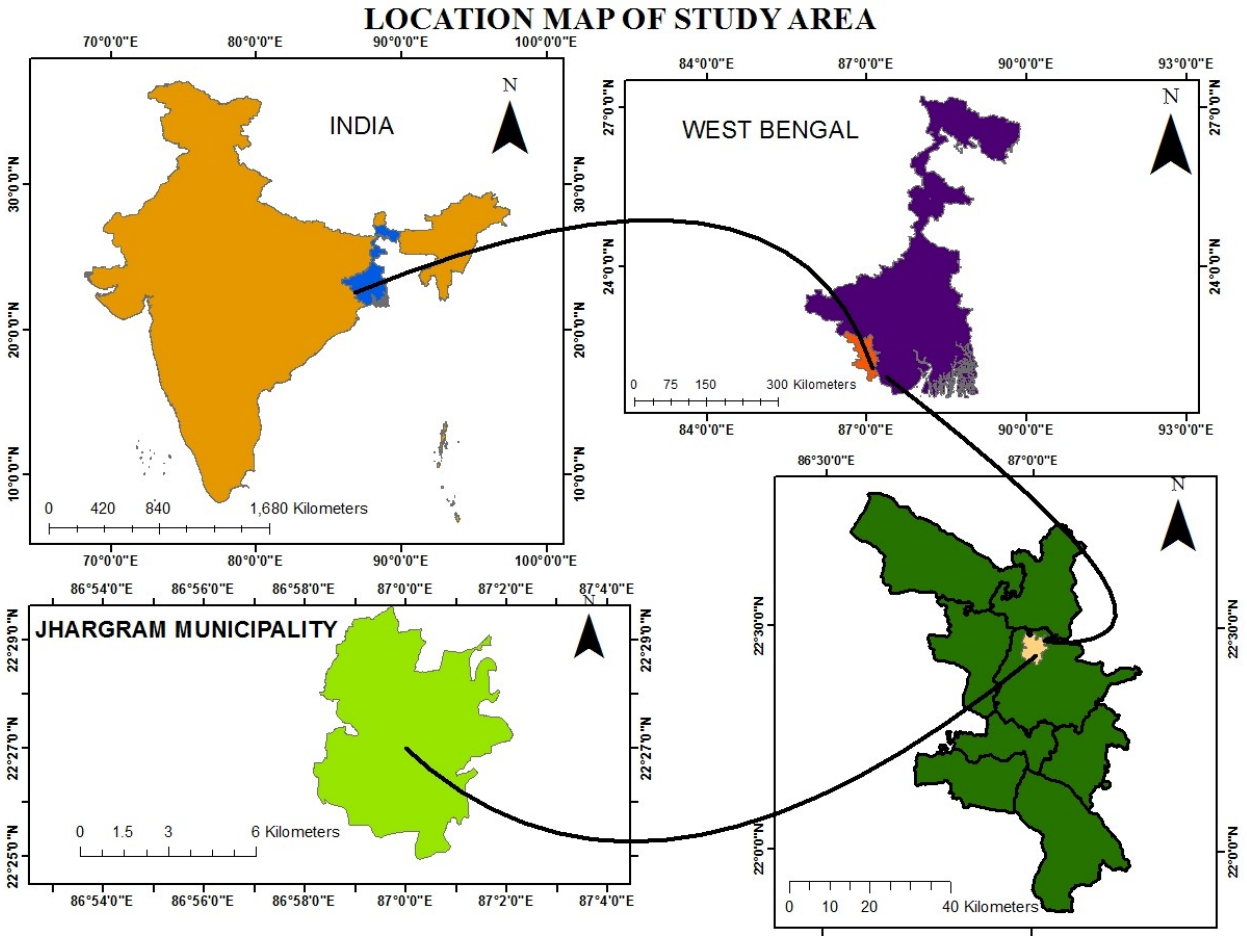


Figure 1

Background and Present Status:

Jhargram is a unique quality Geographical region of West Bengal. The town is celebrated as the city of nature and a sound spot in Bengal India since 1922. Jhargram is a Sadar Sub-divisional Municipality arranged in the centerpiece of Jhargram District of West Bengal, India. Jhargram offers the most colorful marvels of undulating geology coming full circle in slope scopes of Belpahari, Kankrajhor in the North to the peaceful wonders of wandering Subarnarekha River in the South. Jhargram is the heaven of nature darlings with abundant timberlands of Sal, Mahul, wild elephants, deer, and winged creatures. The royal residences, old sanctuaries, people tunes, and rhythms of ancestral make it an even more appealing location for travelers who love to find the obscure and unaffected marvels of nature. **(medical news today, n.d.)**It has a normal height of 81 meters (265 feet).Typically, the climate like quite a bit of Bengal is amazingly muggy and tropical.Temperatures can reach as high as 460C in the hot and dry a long time of May and June yet can fall to about 40C in the cold evening of December and January.

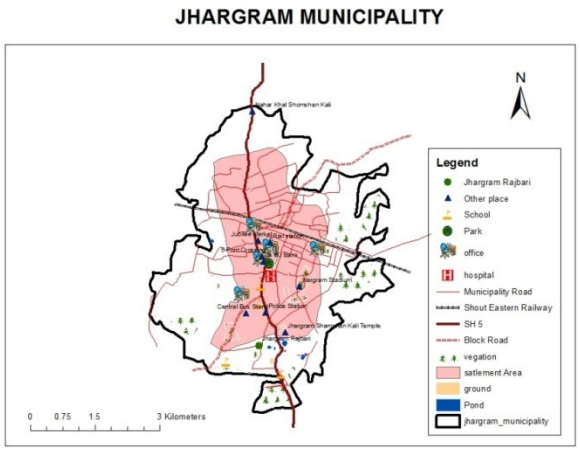


Figure: 2

Encircled by thick Sal and Mohua trees and covered in red earth, Jhargram is an ideal objective for putting in a

Couple of days in quietness, on a nearly minimal effort spending plan. Arranged in West Bengal and very near the Jharkhand State, Jhargram imparts its way of life to the two states. Winter in Jhargram is truly charming. As of the 2011 India registration, Jhargram had a populace of 61,682. Guys establish 50.17% of the populace and females 49.83%. Jhargram has an approx. Normal education pace of 81%. Jhargram town is the Sub-DivisionalHeadquarter of Jhargram Sub-Division including eight squares and nine Police Stations.

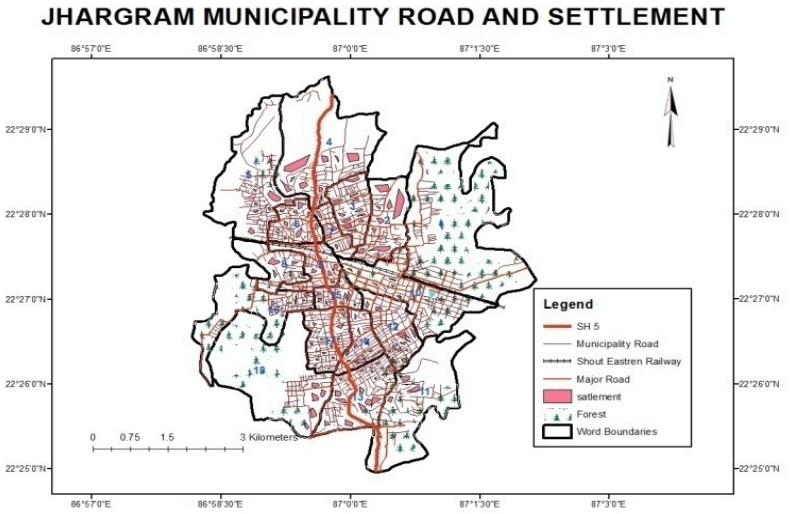


Figure: 3

Jhargram town accomplished its civil status in 1982 embracing 25 mouzas of Jhargram Panchayat Samity. There are 18 (Eighteen) Wards of the region with one councilor each ward. The natural town, Jhargram is covered about 21 sq. km of land an area where the urbanpopulation lives in about 90,000 persons.,also the day population is more than 75 000 at present. So, the municipality area is a very populous town in the district. Recently, this town is the district headquarter of Jhargram district since 2017. About 2500 motor vehicles and about 5000 motorbikes are daily run in the town and also about 25 small and medium industries are situated in the town hinterlands which are run by fossil fuels.

Objectives:-

The objectives of Green & Environmental Auditing are to assess a clean and healthy environment that aids effective learning and provides a conducive learning environment. Entalfactors.To analyze the positive impact on the urban environmentGreen Audit is the most efficient and ecological way to manage environmental problems.

The main objectives of the study for the Research paper are the following:

1. To study the Urban Environmental condition of the Pre-Pandemic situation.
2. To Observation of pandemic effects in 21st Century to human civilization.
3. To find out the existing urban environment in a pandemic situation.
4. To analyze the positive impact on the urban environment.

Methodology and Data Materials:-

The methodology is adopted for this

1. To analyze the positive impact on the urban environment.

Assessment by collecting the information by Onsite visit, Municipality survey, Enquiry, Observation, Perception study and collect data with the help of different scientific Instrument also secondary data

Municipality Map	**Jhargram Municipality**
DEM	**ASTER, USGS USA**
Google Earth	**Keyhole, inc Google U.S. A**
CO2, O2, CO, Ground Water data, Temperature data	**Field data with the help of Air Quality Measuring Instrument and Drilling Machine**

CARBON FOOTPRINT AND HEAT ISLAND IN THE JHARGRAM MUNICIPALITY

SL No	Station	2019 April	2020April

		CO_2(ppm)	CO(ppm)	Tem. (^{0}C)	O_2(%)	CO_2(ppm)	CO(ppm)	Tem. (^{0}C)	O_2(%)
1	SaradaVidyapith More	420	08	35.1	20.9	340	4.5	35	21.4
2	SabitriMandir	450	8.5	35.7	20.9	350	5	35.5	21.2
3	SabitriMandir	510	11	37.7	20.8	350	5.5	37.5	21.00
4	SabitriMandir	490	8.5	36.8	20.8	350	5.5	36.4	21.00
5	Jhargram Stadium	420	8	35.7	20.9	345	5	35.3	21.2
6	ITI Ground and Rack siding	590	11	37.7	20.8	355	6	35.5	21.20
7	Deerpark	400	06	35.1	20.95	340	4.5	35	21.5
8	Kadamkanan	480	08	36.1	20.8	350	5.5	35.2	21.4
9	Rail Station	470	08	35.5	20.8	345	5	35.2	21.3
10	Panchmathar More	590	11	37.9	20.8	350	5.5	36.9	21.2
11	Hospital	480	9	37.2	20.8	345	5.5	36.2	21.2
12	Jublee Market	630	12	37.5	20.7	360	5.5	35.9	20.9
13	Municipality	520	7	36.2	20.75	350	5.5	35.5	21.00
14	DM Office	440	8	35.5	208	345	5	35.2	21.2
15	Lion Eye Hospital	440	8.5	35.6	20.8	340	5	35.5	21.3
16	Burning Ghat(Dahar Khal)	440	8.5	36.1	20.8	340	5	35.6	21.2
17	Srirampur	410	7	35.9	20.9	340	4.5	35.1	21.4

Table 1:- Field Investigation, 2019 and 2020

WARD NO	Avg. Ground Water Level(feet) in April2019(second layer)	Avg. Ground(Water Level(feet) in April season,2020(second layer))
1	135	138
2	135	138
3	155	157
4	155	157
5	175	177
6	175	177
7	155	157
8	190	192
9	190	192
10	190	192
11	205	206
12	225	226
13	190	192
14	175	177
15	175	177
16	165	167
17	165	167
18	165	167

Table 2:- Field Investigation, 2019 and 2020 (Ground Water).

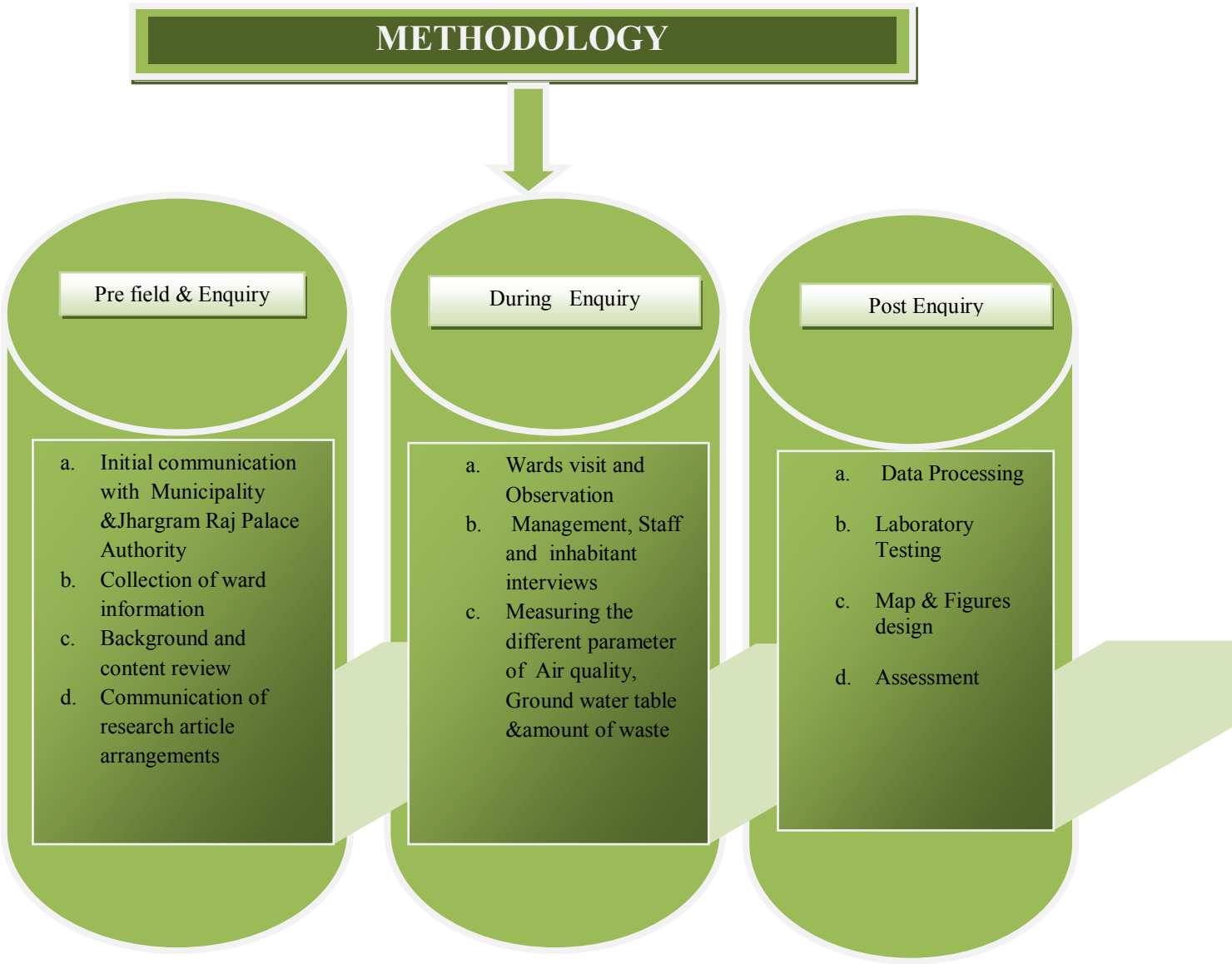
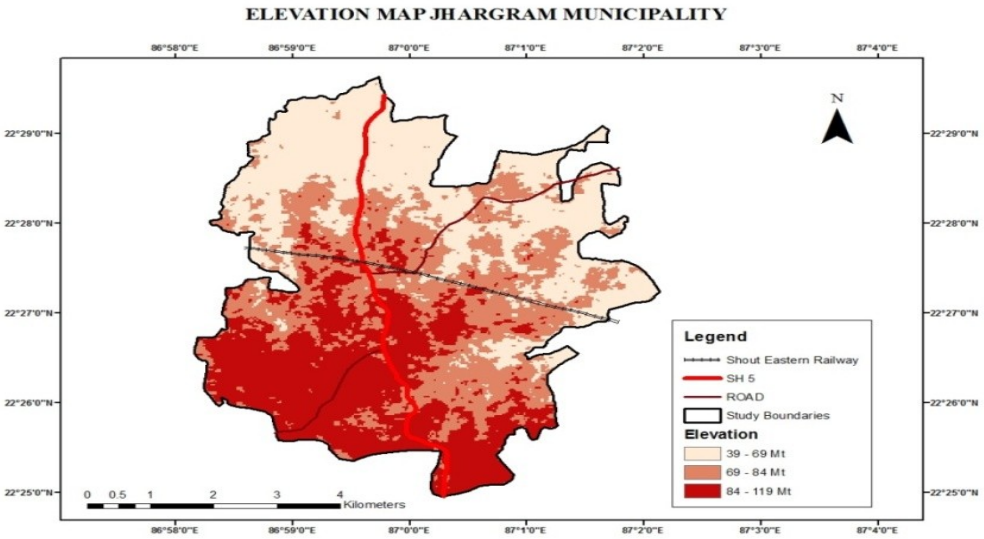


Figure 4:-

Method Systems:
Figure: 4
The study area analyzed to use the inverse distance weighting interpolation (IDW) Method (Burrough and McDonnell 1998; Bedient and Huber 1992**(Wojciech, 2020)**
ZP= ∑ni=1(zi/dip)/ ∑ni=1(1/dip)
Zp= Predicted valueZi= Value at $i$measured pointdi= distance of $i$measured location to predicted point$p$= power function n= number of points to be used

The research methodology of this work has been categorized into three parts, these are pre-field, fieldwork, and post fieldwork. Firstly, Before visiting the field area, total Jhargram municipality area, existing kinds of literature, published and unpublished report of the government and non-government organization, various cartographic materials, satellite data, etc.As per pre fieldwork, IhaveStudied that the town status and background of the town hinterland with



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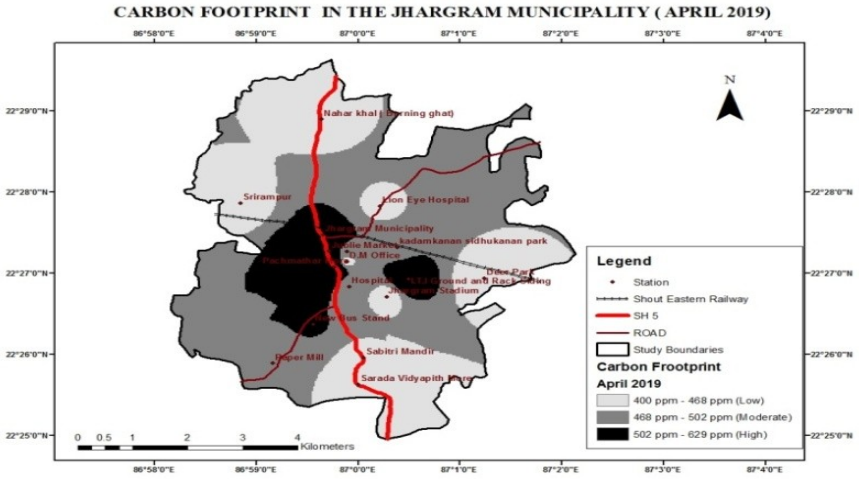
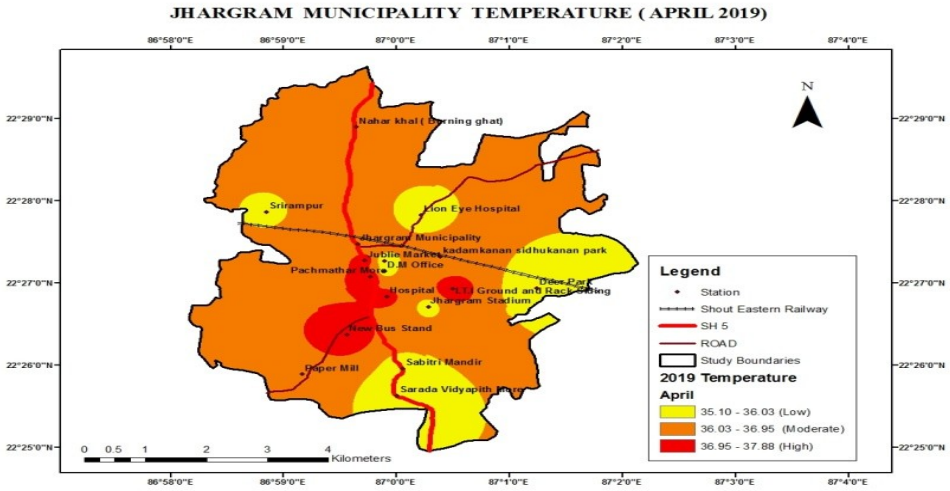


Figure: 6

environmental assets of Jhagram Surrounding. As per field inquiry using various measuringinstruments and survey techniques during different times mainly pre lockdown and during lockdown periodin COVID-19 Pandemic situation in 2020 during 21stCenturyto Understand a complete air quality and the atmospheric condition also otherenvironmental conditions in the town area. I have been done through the fieldwork during field observation with the help of some important tools and techniques in the collection of data by the air quality measuring instruments and sound level meter. As per post fieldwork, the present research work is concerned with thepandemicsituation



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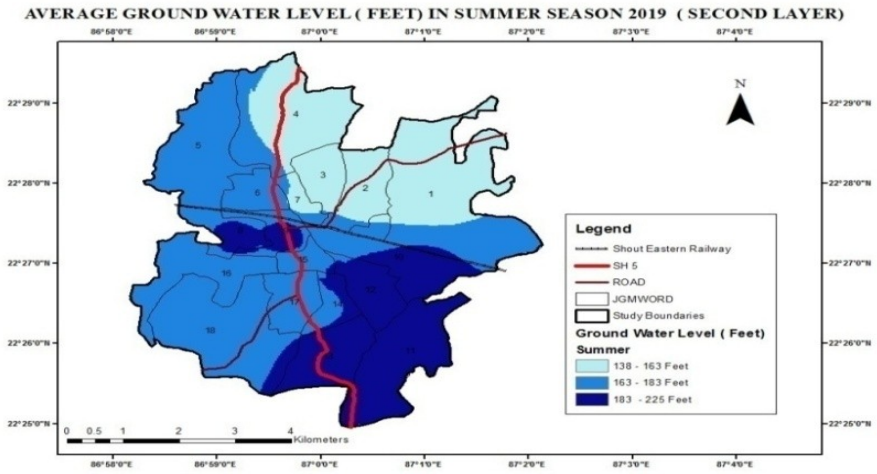


Figure:8

Positiveatmospheric condition also othersimpact on the environment in Jhargram town. In this phase, all the information is collected to be interpreted to establish the concept gathered during the fieldwork. GIS and remote sensing software, cartographic techniques, and also statistical application have been used in the total post filed work.

Existing Environment Of Jhargram Municipality:

Geologyand Lithology: -TheJhargram District town is under the lateritic undulating land surface area and fringe area of the Chhotonagpur plateau. We have studied that the succession of sedimentation and soil profile is prominent, it has been developedGondwanaand Carboniferous era. The Geographical area of the town has been developed by the lateralization process fora long time in the tertiary period. By the field investigation, we have observed thatthe lateritic sediment layer is exiting about three to five meters. It is a zonal Lateritic soil profile. Quartzite, Mica Schist, Limestone, and Conglomerate are common rocks and minerals found here and there in the Geographical area.

Geomorphology and Topography: The study area that the Jhargram town is under the peneplain area of Chhotonagpur plateau. The average height of the urban area is about 81 m. By the field investigation we have measured and studies that the 88 m the highest elevation of the town which point is situated at Jhargram Raj College playground and others hand 72 m is the lowest point of the town, it is located at the point of burning Ghat (Nahar Khal) and also Gaighata agricultural basin. So the slope of the town is to direction, one side is the toward the

Kansabati river basin in the North and North-Western part of the town and another side South and South- Western direction towards the Dulung river basin.So,theJhargram municipality area is a water divider.

Busy Five point crossing,2019 April

Climate and Environmental Condition: The environment of Jhargram Municipality is under the tropical humid climate. By the measurement with the help of different instruments in different seasons,we have studied that the highest temperature occurs in the summer season for April, May,and June. The highest average temperature is about 37 ^{0}C in April 2019 and 35^{0}C in April2020.The average rainfall of the town occurs 132 to 142 cm in the year 2019, humidity is less than 50% in April. April month is the driest month of the year.

Lock Down 5 Point Crossing April 2020

Vegetation and Naturalforest:

Jhargram municipality area is under the tropical deciduas forest regions of the south Bengal mainly Sal, Palas, Mahuya, Segun also Chatim are common vegetation of this area. About 40% ofthe land area of the municipality is covered by Saltrees which are heritage Salforest. As result, the maximum Oxygen is producing by the photosynthesis of the vegetated area. So, the Oxygen level is very high in the town more than 21.2% in April 2019, and also Oxygen level in April 2020 is more than 21.5%. So,the weather and climate in the municipality are very Clean, comfortable, hospitable, and also healthy.

Figure: 9

Figure: 9

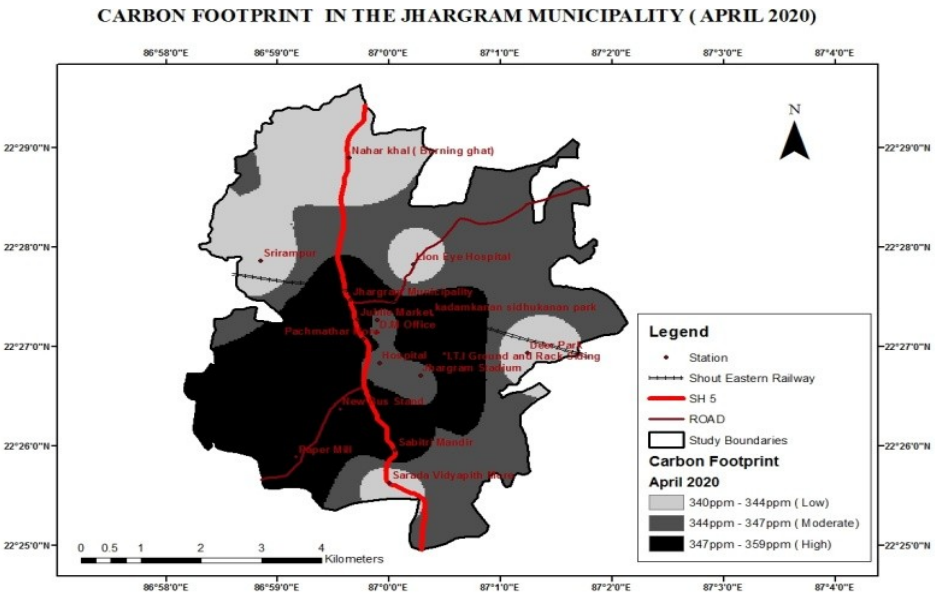


Figure: 9

Water bodies and Groundwater:
Ponds and Shallow basins are the source place of surface water. By the field investigation, we have studied that the eight biggest ponds are located in town and elevensmall size ponds are situated here and there in the municipality area. About 7% ofthe land area is covered by Surface water bodies and also we have observed that about 60% of water bodies are located in the old Jhargram area, especially word no 11. Another hand about seven basins also shallow low land is situated at Gaighata, Bhachhurdoba, Kadamkanan, Jamda, BamdaMeharabandh, and also Nahar Khal area. The average underground water level is 140 feetto 180feet (2nd layer). By the survey, we have observed and fined that the groundwater level is diminishing in the month of the summer season from about 1 foot to 2 feet. We have studies that the depth of the groundwater tablehas occurred south and south-western part mainly word no 13, 14, 17 wherethe groundwater level is 180 to 210feet depth.

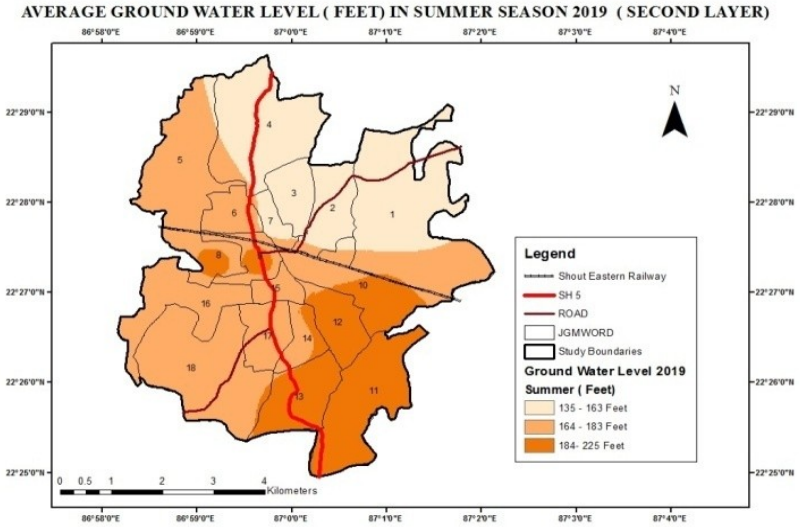


Figure: 10

and the relatively lowest deepest groundwater table found in the area of north and northeastern part of the town where the groundwater level is about120 to 150 feet depth

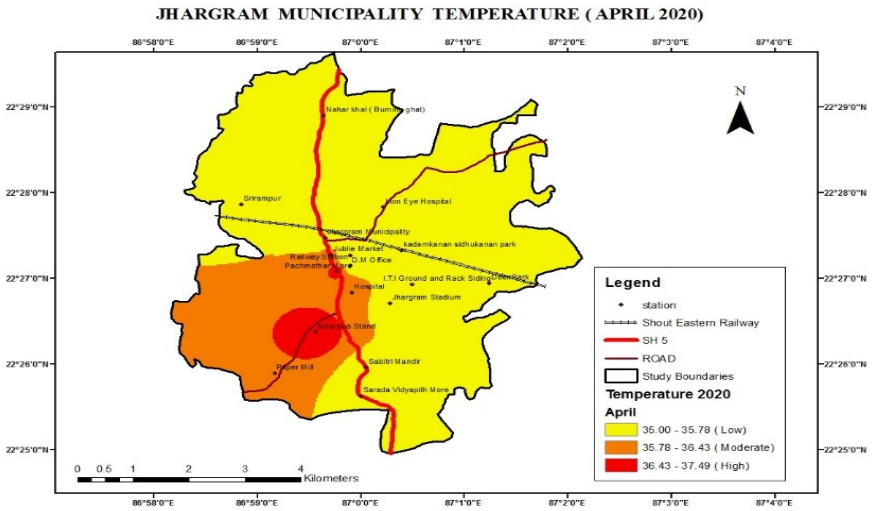


Figure: 11

Result And Assessment:-

According to the WHO, a pandemic involves the worldwide spread of a new disease. While an epidemic remains limited to one city, region, or country, a pandemic spreads beyond national borders and possibly worldwide. Authorities consider a disease to be an epidemic when the number of people with the infection is higher than the forecast number within a specific region. If an infection becomes widespread in several countries at the same time, it may turn into a pandemic. For this reason, Policymakers and Governments of several countries are decided that the Lockdown policy takestostopmixingthe human body and social distancing. As result, Transports, Industries, Business hubs, Education institutions, Offices are lockdown for two months to three months world wise in several countries also our motherland India. For this situation, we have seen the pollution of our environment is extremely minimized; about 60% to 70% is reduced. The Jhargram town of West Bengal in India is a district town of South Bengal which is located under the forest area. That town is Green and Clean which is known as the City of Nature. By the inquiry and field survey with the help of different pollution measuring instruments for Pre-lockdown and during a lockdown, I have observed that CO_2, CO, and Dust particles are decreased other hand O_2 and RH of all air quality elements are increased during a lockdown. Pre Lockdown on 18th April 2019, I have recorded that the density of CO_2 in the city atmosphere is about 450 to 590ppm, the amount of CO is about 12 to 14ppm, andthe amount of O_2 is about 20.80%. Generally,the temperature has risen in April 2019 due tothe high amount of Greenhouse gas concentration caused by fossil fuel consumption.Further,by the intensive study with the help of air quality measuring instrument that the highest density and concentrate CO_2 zones are Jubilee Market, Rake siding (ITI ground), and Five crossing point where are amount of CO_2 620ppm,590ppm, and 580ppm respectively. By the inquiry, we have analyzed that large amount of CO_2 at the places caused by Fossil fuel consumption. But, the maximum CO_2 concentrate zone is Jubilee Market in the Municipality where CO_2 is 620ppm. It is caused by Human respiration CO_2 thatis HrGhCO2. The Jubilee Market is very congested, with Day population, less wind blowing path, and vegetation less area, as result Human respiration Green House CO_2 is more. We have analyzed by the following equation:

$HrGhCO_2 = [Tp\ (Hr\ CO_2/h)\ dt]$……..equation-1

Where, $HrGhCO_2$ - Human respiration Green House CO_2

Tp- Total Day Population

Hr CO_2– the amount of Human Respiration CO_2

h-Hour

dt- Duration time in an hour

So, we have surveyed that the per day total Day Population is about 15,000 persons and staying duration time is 2 hour for 12,000 persons and 10 hours for 3000 persons. We know the release amount of CO_2 per person is 500 liters so, after the calculation, that the amount of $HrGhCO_2$ is about 11, 24,900liters, as result $HrGhCO_2$ is 620ppm. At the lockdown period in April 2020, that time market wasclosed, as a result of less Day Population at the market and not found $HrGhCO_2$. For this reason, the density of CO_2 is about the only 350ppm.

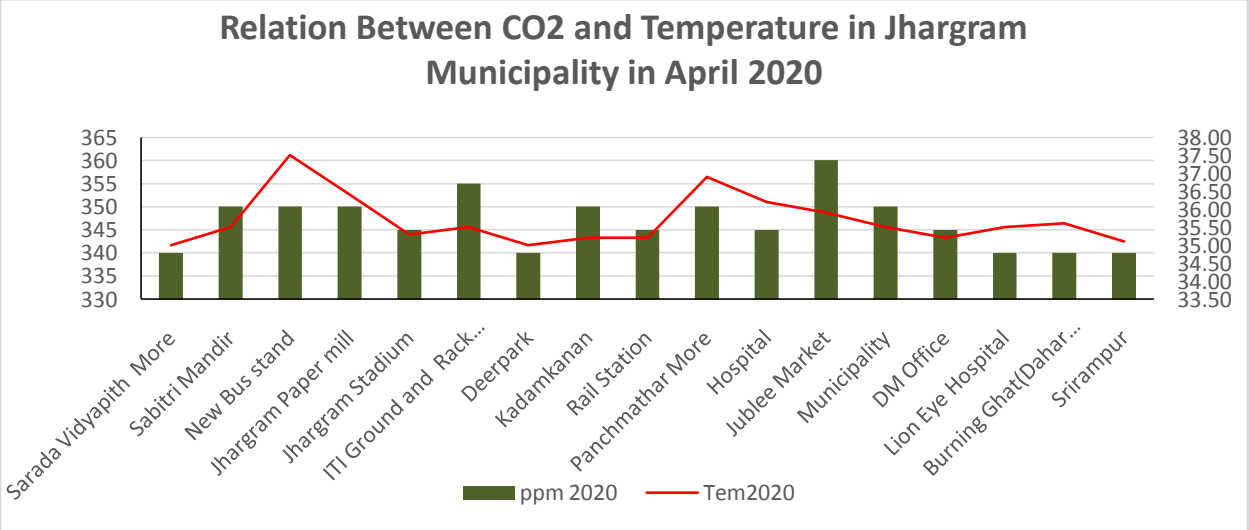
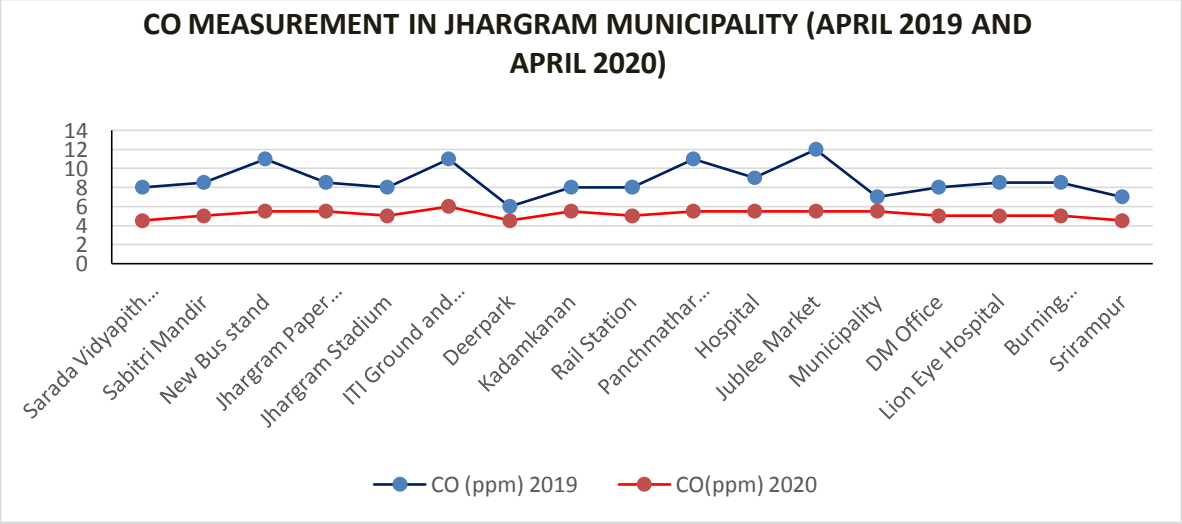


Figure: 12

Other hand, during the Lockdown on 24th April 2020, I have recorded that the density of CO_2 is 340ppm to 345ppm, CO is about 5ppm and the amount of O_2 is about 21.50 % to 21.60%. As result, the air quality of the town is highly hospitable and healthy for Human respiration.Not only the improvement of air quality but also minimize the daily uses of water. By the inquiry, I have measured that about 50% to 60% daily uses of water is reduced in the town. As result, the underground water level has been a little risen during the summer season in Jhargram which rate is 1to 2 feet. Finally, I have expressed that, a Pandemic situation caused by a microbe Novel Corona Virus COVID-19 is positive influenced environmental quality as well as to create a Green and Healthy ecological home for inhabitants in the city of nature



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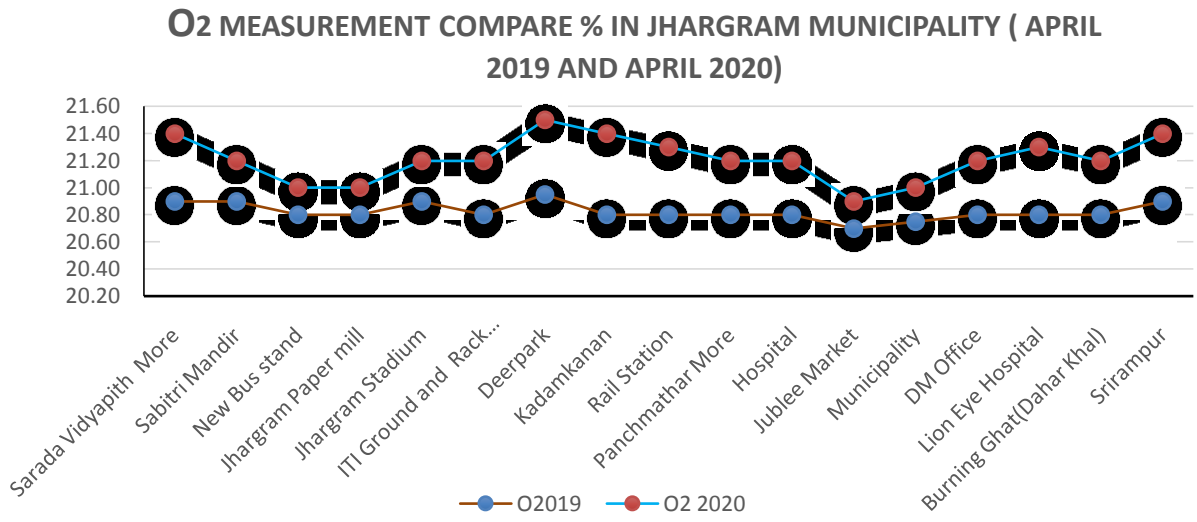

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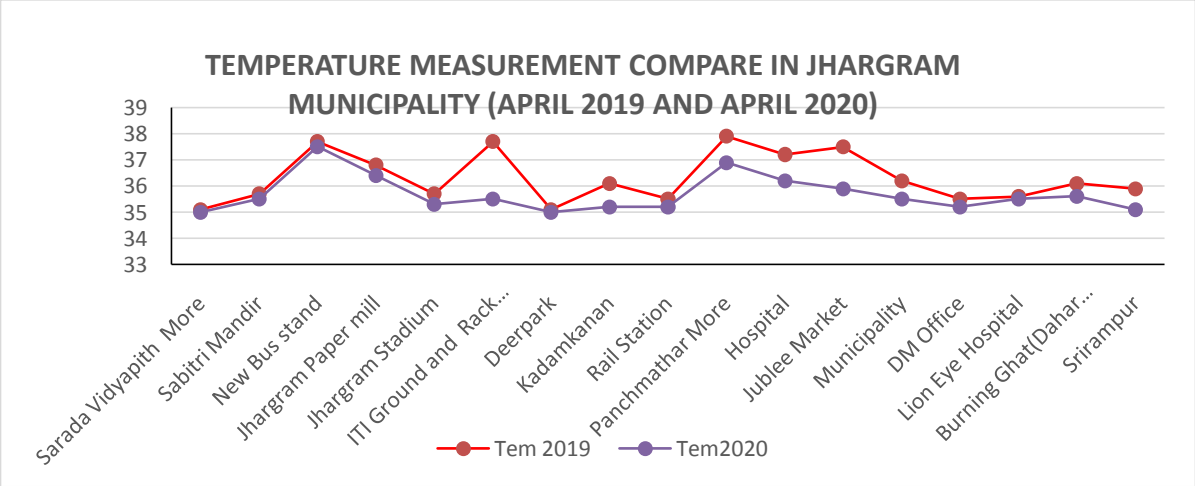

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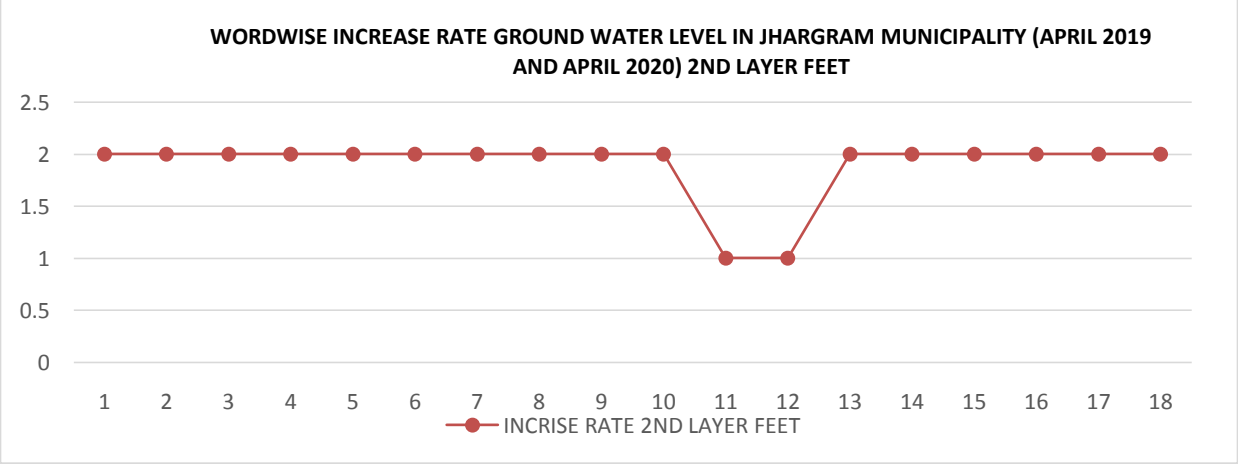

Figure: 16

Conclusion:-

A Anthropogenic activities and process is operating in the Jhargram Municipality that the rise of Greenhouse gases and more consumption of fossil fuels in the last five years mainly, after introducing the District Town. It results in more opaque to earth radiation. This results in energy flowing back and forth between the surface and the lower atmosphere for this reason the temperature is generally increasing in the atmosphere of the Municipality. But Green House gases and other particles areminimizedwhichare CO2, CO, andDustparticles also Day population in April 2020 in the Hot Summer season. The amount of CO_2 is reduced from 450ppm to 350ppm and the CO is reduced from 12ppm to 6ppm also resultsina rate of temperature that is generally a little decreased which is 1.2^0C in the municipality area due to Lockdown during the Pandemic situation in the 21stCentury.By the analysis, that the underground water level has been a little risen during the summer season in Jhargram which rate is 1to 2 feet. Finally, I have expressed that, a Pandemic situation caused by a microbe Novel Corona Virus COVID-19 is positive influenced to environmental quality as well as to create Green and Healthy ecological home for inhabitant in the city of nature.

References:-

1. Aahil, D. (2020). COVID-19 and Climate Change. Journal of Health Policy & Opinions, 13(2), 1-5. Retrieved from COVID-19_Climate_Change.pdf
2. Abdelwhab, E. S. (n.d.). Circulation of avian influenza H5N1 in live bird markets in Egypt. Avian Dis. 54, 911-914.
3. Åsa, E. T. (2017). Impacts of Climate Change on Urban Areas and Nature-Based Solutions for Adaptation. doi:10.1007/978-3-319-56091-5_2
4. Athanasios, V. (2019). Current Environmental Issues and Emerging Global Challenges in the 21stCentury for Environmental Protection and Sustainable Development. Retrieved from EMERGING-ENVIRONMENTAL-ISSUES-DECEMBER-2019.pdf
5. B, L. R. (2004). Another Reason for Concern: Regional andGlobal Impacts on Ecosystems for Different Levels of Climate Change. GlobalEnvironmental Change, 14, 219-228.
6. Balasubramanian M, B. V. (2012). Climate Change and Its Impact on India. The IUP Journal of Environmental Sciences,, VI, 31-46.
7. ChmielewskiJarosław, K. P.-D. (n.d.). Anthropogenic impact on the environment (case study). Environmental Protection and Natural Resources, 29, 30-37. doi:DOI 10.2478/oszn-2018-0006
8. Cowtan, K. &. (2014). Coverage bias in the HadCRUT4 temperature series and its impact on recent temperature trends. 1935–1944.
9. Forster M. Piers, F. H.-F. (2020). Current and future global climate impacts resulting from COVID-19. Naturecimate change, 10, 13–919. doi:https://doi.org/10.1038/s41558-020-088
10. (2020-2021). GEOGRAPHY AS A DISCIPLINE. NCERT. Retrieved from https://ncert.nic.in/textbook/pdf/kegy201.pdf
11. Gosain A K, S. R. (2006). Climate Change ImpactAssessment on Hydrology of Indian River Basins. Current Science, 90, 346-353.
12. Gregory D. Breetzke, D. W. (2020). The academic staff profile of Geographers at higher education institutions (HEIs) in South Africa: the challenges for transformation. Journal of Geography in Higher Education, 1-19. Retrieved from https://www.tandfonline.com/doi/citedby/10.1080/03736245.2003.9713787?scroll=top&needAccess=true
13. JHARGRAM. (n.d.). Retrieved from https://jhargram.gov.in/bn/
14. Kalenik, M., &Chalecki, M. (2019). Nvestigations on the effectiveness of wastewater purification in medium sand with assisting clinoptilo-lite layer. 117–126.
15. MalhiYadvinder, F. J. (2019). Climate change and ecosystems: threats. Retrieved from https://royalsocietypublishing.org/doi/pdf/10.1098/rstb.2019.0104
16. medical news today. (n.d.). Retrieved from https://www.medicalnewstoday.com/
17. (n.d.). NATURE OF GEOGRAPHY AS A DISCIPLINE. Retrieved from https://www.nios.ac.in/media/documents/316courseE/ch1.pdf
18. Podlasek, A., Koda, E., &Vaverková, M. (n.d.). The Variability of Nitrogen Forms in Soils Due to Traditional and Precision Agriculture: Case Studies in Poland. International Journal of Environmental Research and Public Health.
19. R, D. S. (2007). Variability of Climate Change in Ind. Current Science,, 93, 782-788.

20. RiffatSaffa, P. R. (2016). Future cities and environmental sustainability. Future Cities and Environmen, 1-23. doi:10.1186/s40984-016-0014-2
21. Sanjib, M. (2021). GEOSPATIAL TECHNOLOGY AND APPLICATION OF LOCAL LEVEL URBANISATION ANALYSIS AND DEVELOPMENT WORD NO 13 IN THE JHARGRAM MUNICIPALITY WEST BENGAL. Journal of the Maharaja Sayajirao University of Baroda, 55, 34-42.
22. Sanjib, M. (2021). TRAVEL ROUTE PLANNING FOR ECO-TOURISTS OF JUNGLE MAHALS OF WEST BENGAL. SambodhiJournal (UGC Care Journal), 46, 352-361.
23. STEWART, H. J. (2001). Challenges for Environmental Education: Issues and Ideas for 21st Century. BioScience, 51, 283-288.
24. ten Brink Patrick, M. K.-P.-R. (2016). The Health and Social Benefits of Nature and Biodiversity Protection Marianne,. Retrieved from https://ec.europa.eu/environment/nature/biodiversity/intro/docs/Health%20and%20Social%20Benefits%20of%20Nature%20-%20Final%20Report%20Main%20sent.pdf
25. Turnock, S. T. (2019). 300 years of tropospheric ozone changes using CMIP6 scenarios with a parameterised approach. 686–698.
26. Unnikrishanan A S, R. K. (2006). Sea Level Changes Along the Indian Coast: Observations andProjections. Current Science, 90, 362-368.
27. V, S. (2016). The Human–Nature Relationship and Its Impact on Health: A Critical Review. doi:10.3389/fpubh.2016.00260. ECollection 2016.
28. Weng, Q. X. (2013). Use of earth observation data for applications inpublic health. Geocarto Int. 1-14.
29. Wojciech, M. (2020). Inverse distance weighting method optimization in the process of digital terrain model creation based on data collected from a multibeamechosounder. Applied Geomatics (12), 397–407. Retrieved from Maleika2020_Article_InverseDistanceWeightingMethod.pdf
30. World Health Orgnization. (n.d.). Retrieved from https://covid19.who.int/
31. WuaXiaoxu, L. Y. (2016). Impact of climate change on human infectious diseases: Empiricalevidence and human adaptation. Environment International, 86, 14-23. doi:http://dx.doi.org/10.1016/j.envint.2015.09.007
32. Xia, X., Zhang, S., Li, S., Zhang, J., Wang, G., Zhang, L., Li. (2018). . The cycle of nitrogen in river systems: Sources, transformation, and flux.Environ. Sci. Process. Impacts. 20, 863–89.