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AN APPRAISAL IN THE AIR AND RIVER WATER QUALITY OF THE INDUSTRIAL TOWN OF HALDIA, WEST BENGAL.

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Abstract

For proper functioning of body and for overall growth and development of a healthy brain, clean air and water support is necessary. Air pollutants such as fine particulate matter, ground-level ozone, sulfur oxides, nitrogen oxides, carbon monoxide, and greenhouse gases can harm our health and the environment. At the same time, excess amount of nitrogen and phosphorus in run offs, presence of medicines, chemicals, lead, and pesticides in water also pose threats to well-being and quality of life, not only for human beings but also for the other creatures. Haldia is the most industrialised town of Purba Medinipiur district of West Bengal. Numerous large and medium scale industries have been set up in the town around the river Rupnarayan. Over time the number of industries are growing at a faster rate and are largely affecting the ambient air and river water qualities of the major river flowing through the town which in turn are leaving a long term impact on the health of the residents of Haldia.

Key Words: Clean air, Air pollutants, Chemicals, Run offs, Environment, Industrialised town, Health of the residents.

Introduction

Industrial growth in the district of Purba (East) Medinipur in West Bengal started during the Fourth Five Year Plan Period (1969 – 1974) only after the construction of an oil jetty at Haldia on the bank of Haldi river along the coast of Bay of Bengal in 1968. In order to promote industrial growth the Commerce and Industries Department of West Bengal Government announced (1973) a package of incentives to industrial entrepreneurs. The West Bengal Industrial Development Corporation (WBIDC) was formed (1973) and West Bengal Industrial Infrastructure Development Corporation (WBIIDC) was set up (1974) for the development of growth centres in West Bengal with a specific focus on Haldia and industrial growth in Midnapore district leading to the establishment of a large number of private sector enterprises like Hindustan lever, Exide Industries, public sector industry like oil refinery of Indian Oil Corporation and joint sector industries like Haldia Petrochemicals etc. By the end of 70s, the oil jetty at Haldia was transformed into a complete Dock Complex. During this time oil refinery commenced its production, fertilizer plant construction was initiated, petro-chemical complex was under negotiations, and a large number of industries were lined up for establishment along the railways and national highways.

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Clean air and water support healthy brain and body function, growth, and development. Air pollutants such as fine particulate matter, ground-level ozone, sulfur oxides, nitrogen oxides, carbon monoxide, and greenhouse gases can harm our health and the environment. The major urban air pollutants can give rise to significant respiratory morbidity. Excess nitrogen and phosphorus in run-off, medicines, chemicals, lead, and pesticides in water also pose threats to well-being and quality of life. It has been estimated that contaminants in drinking water sicken up to 1.1 million people per year. Improper medicine disposal, chemical, pesticide, and microbiological contaminants in water can lead to poisoning, gastro-intestinal illnesses, eye infections, increased cancer risk, and many other health problems. Poor surface water quality can also make lakes unsafe for swimming and wild fish unsafe for consumption. Nitrogen pollution and harmful algae blooms create toxins in water, which can lead to rashes, stomach or liver illness, respiratory problems, and neurological effects when people ingest or come into contact with polluted water. Water pollution also threatens wildlife habitats.

Industrial pollution is the pollution which can be directly linked with industry. This form of pollution is one of the leading causes of pollution worldwide. There are a number of forms of industrial pollution. Industrial pollution can also impact air quality, and it can enter the water, causing widespread environmental problems. Industrial activities are a major source of air, water and land pollution, leading to illness and loss of life all over the world.

Objectives

The objectives for this article are as under -

- To study the ambient air quality of Haldia.
- To study the water quality of river Rupnarayan at Haldia and Geonkhali
- To understand how the air and water quality have been changed over time.

Research methodology

This research paper is based on secondary data collection from various research articles, newspaper, reports, e-journal and different websites and from the office of West Bengal Pollution Control Board.

Findings and Analysis

Over the centuries air pollution problems have been referred to as “smoke” problems, even though sulphur oxides as well as particulate matter have generally been involved. Air pollution is caused by a variety of factors such as vehicular exhaust, cooking fire, heaps of domestic garbage etc. The greatest single factor causing air pollution is the fume emitted by chimneys of the factories which contains substantial quantities of sulphur di oxide, dust particles and other impurities.

Various industries in and around Haldia contribute gaseous substances to the atmosphere. The refinery of Indian Oil begins with crude oil and separates it into gas, gasoline, kerosene, diesel, fuel, fuel oil, heavy bottoms etc. Depending on the amount of refining that takes place large number of pollutants are produced. Emissions include oxides of nitrogen (NO_x) and

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sulphur (SO_x), carbon (CO) and hydrocarbons. The chemical industries produce HF (hydrofluoric) substances, SO_2, H_2S (hydrogen sulphide) and fluosilicic acids (H_2SiF_6).Lime producing plant site has serious dust problems.

The following table (Table-1) shows the air quality at Haldia.

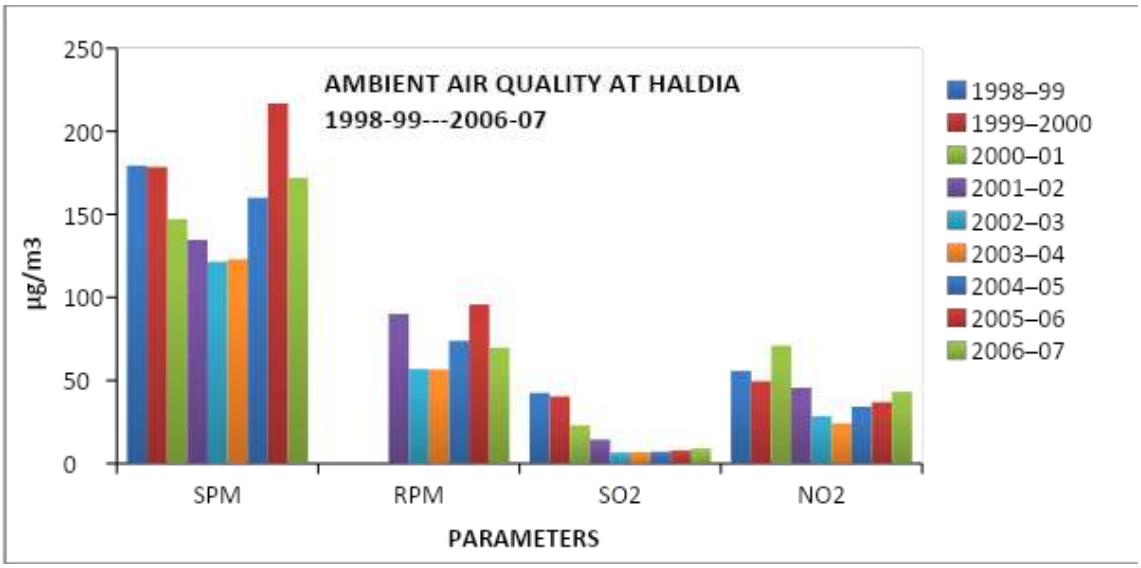
Table-1. Ambient air quality at Haldia, 1998-99 –- 2006-07.

YEAR	SPM (in µg/m^3)	RPM (in µg/m^3)	SO_2 (in µg/m^3)	NO_2 (in µg/m^3)
1998–99	179.3	–	42.5	55.7
1999–2000	178.4	–	40.4	49.5
2000–01	147	–	23	71
2001–02	134.6	90	14.4	45.6
2002–03	121.5	56.8	6.6	28.4
2003–04	123	56.6	6.8	24.1
2004–05	159.9	73.8	7.1	34.2
2005–06	216.6	95.7	7.8	36.9
2006–07	171.9	69.7	9.1	43.1

SPM= Suspended Particulate Matter, **RPM=**Respiratory Particulate Matter

SO_2=Sulphur di Oxide, **NO_2=**Nitrogen di Oxide

Source: Annual Report, 1998–99 to 2006–07, West Bengal Pollution Control Board



Source: As in Table-1

Fig. 1

It is seen that the highest amount of Suspended Particulate Matter (SPM) was observed in 2005-06; otherwise SPM remains around 170 µg / m^{3}at Haldia (Fig. 1). Respiratory Particulate Matter (RPM), Oxides of Sulphur (SO_2) and Nitrogen (NO_2) are within the average level set up by West Bengal Pollution Control Board (WBPCB).

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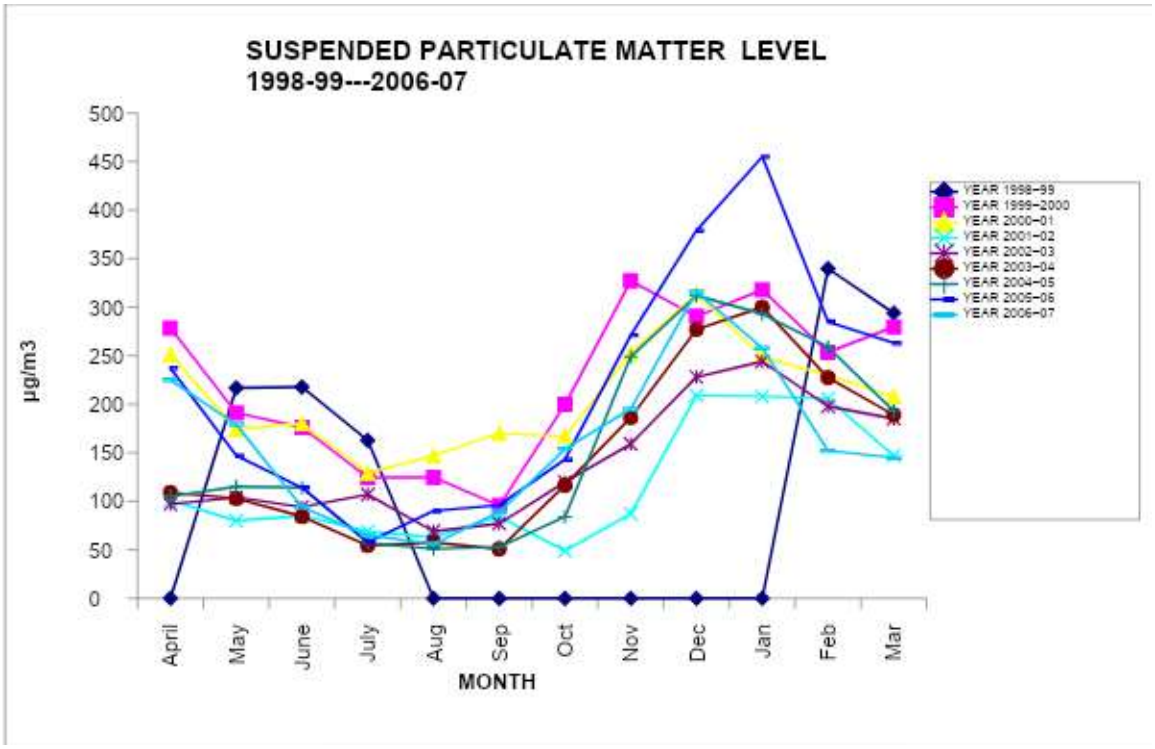
Table-2. Suspended Particulate Matter (SPM in µg/m^3) content in air at Super Market, Haldia, 1998-99 –- 2006-07.

MONTH	YEAR								
	1998–99	1999–2000	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006–07
April	–	278.4	251	101	97	109	105	237	225
May	216.8	191.2	174	80	104	103	115	147	179
June	217.8	176.1	180	85	94	84.3	114	114	94
July	162.7	124.6	129	69	107	54.4	57	58	65
Aug	–	124.6	147	63	69	57.6	51	90	56
Sep	–	95.7	170	84	77	50.8	53	96	89
Oct	–	199.7	167	49	120	116.4	84	143	154
Nov	–	327.1	253	87	159	186.3	249	271	195
Dec	–	290.5	314	209	228	277.1	312	379	316
Jan	–	317.9	249	208	244	300	293	455	258
Feb	339.6	253.4	230	206	198	227.2	259	285	152
Mar	293.9	279.7	208	147	185	189	193	263	145

Source: Annual Report 1998–99 to 2006–07, West Bengal Pollution Control Board



Source: As in Table-2

Fig. 2

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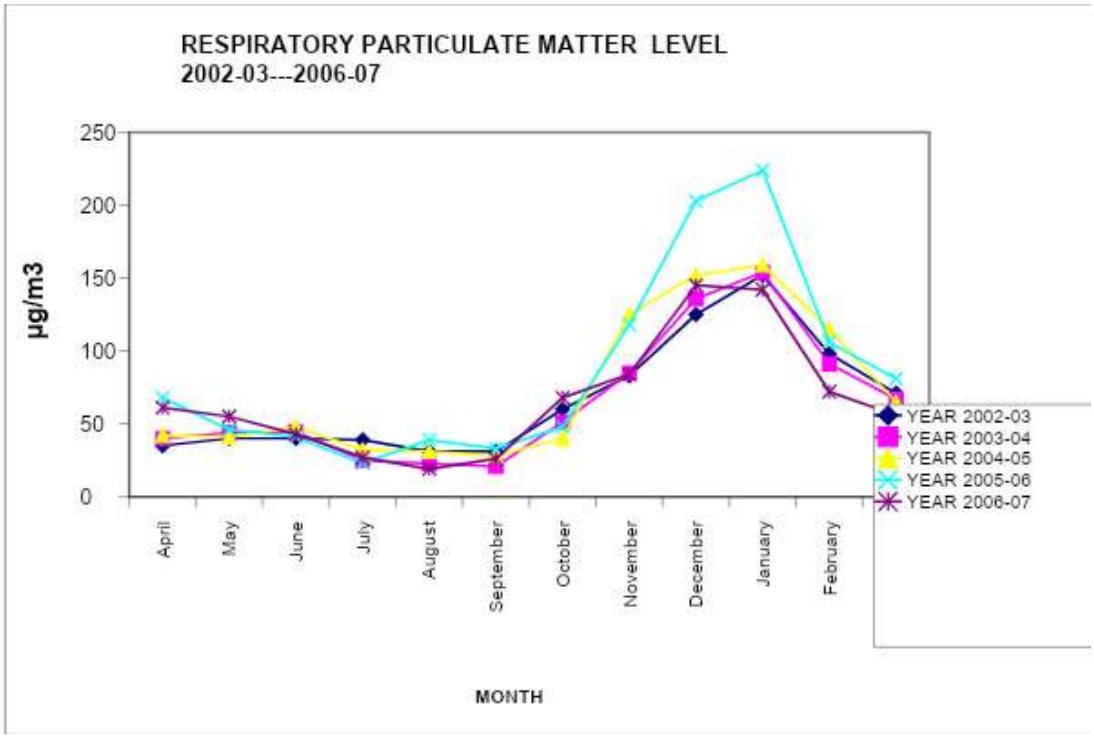
Table-3. Respiratory Particulate Matter (RPMin µg/m^3) content in ambient air quality at Super Market, Haldia, 2002-03 –- 2006-07.

MONTH	YEAR				
	2002-03	2003-04	2004-05	2005-06	2006-07
April	35	40	42	68	61
May	40	43.9	41	46	55
June	40	44.6	48	41	43
July	39	25	32	23	27
August	31	22.8	31	39	19
September	31	20.7	28	33	26
October	60	51.2	40	48	68
November	83	84.9	125	118	84
December	125	135.7	152	203	145
January	152	154	159	224	142
February	98	91.2	115	106	72
March	71	67	65	81	56

Source: Annual Report 1998–99 to 2006–07, West Bengal Pollution Control Board



Source: As in Table-3

Fig. 3

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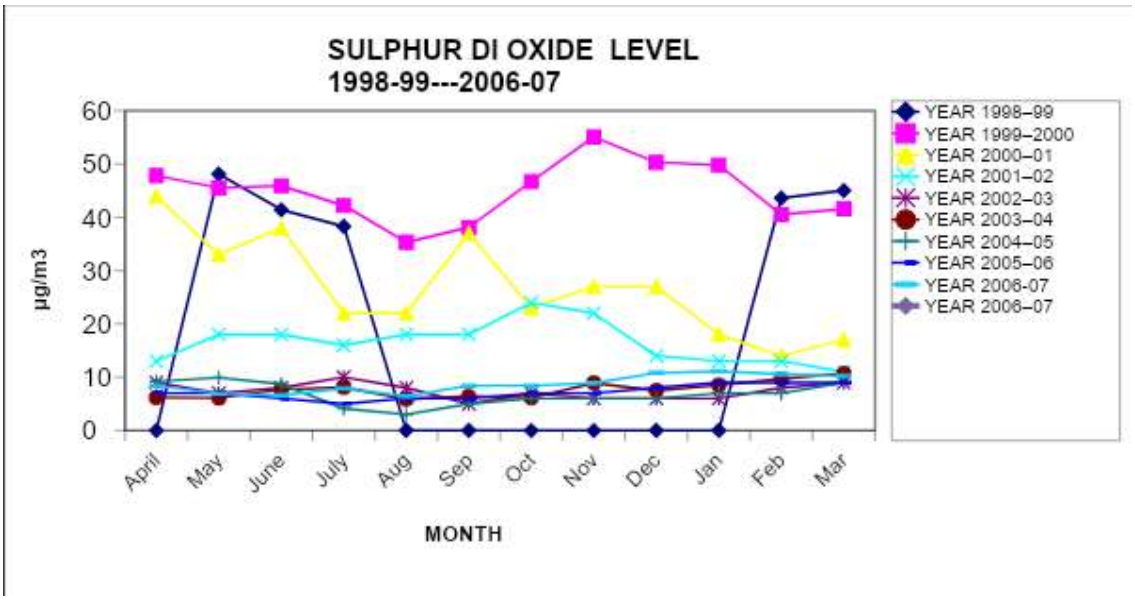
Table-4.Sulphur di Oxide (SO_2in µg/m^3) content in ambient air quality at Super Market, Haldia, 1998-99 –- 2006-07.

MONTH	YEAR								
	1998–99	1999–2000	2000–01	2001–02	2002–03	2003–04	2004–05	2005–06	2006-07
April	–	47.8	44	13	9	6.2	9.2	7	8.4
May	48.1	45.5	33	18	7	6.1	9.9	7	6.9
June	41.4	45.9	38	18	8	7.7	8.7	6	6.6
July	38.3	42.2	22	16	10	8.1	4.1	5	7.9
Aug	–	35.3	22	18	8	5.9	3	6	6.4
Sep	–	38.1	37	18	5	6.4	5	6	8.4
Oct	–	46.7	23	24	7	6.1	6	7	8.4
Nov	–	55.1	27	22	6	8.9	6	7	8.9
Dec	–	50.3	27	14	6	7.5	6	8	10.8
Jan	–	49.8	18	13	6	8.5	7	9	11.1
Feb	43.6	40.5	14	13	8	9.7	7	9	10.6
Mar	45	41.6	17	11	9	10.7	9	9	10.2

Source : Annual Report 1998-99 to 2006-07, West Bengal Pollution Control Board



Source: As in Table-4

Fig. 4

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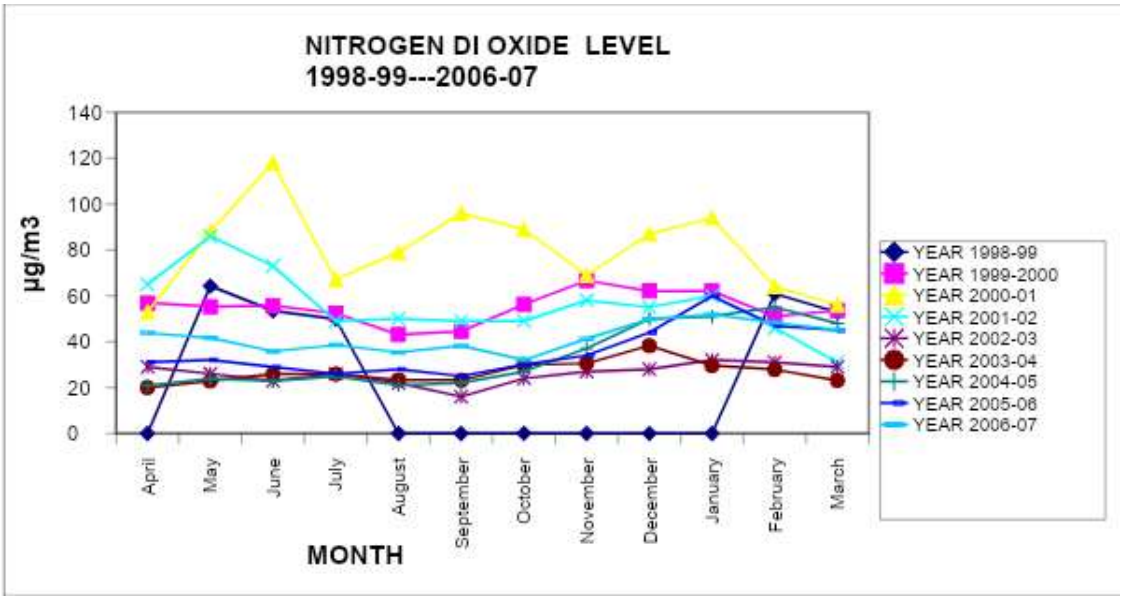
Table-5. Nitrogen di Oxide (NO_2in µg/m^3) content in ambient air quality at Super Market, Haldia, 1998-99 –- 2006-07.

MONTH	YEAR								
	1998-99	1999-2000	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
April	-	56.9	53	65	29	20	20.9	31	43.8
May	64.3	55.3	88	86	26	22.9	23.9	32	41.6
June	53.5	55.7	118	73	23	25.9	22.8	29	35.8
July	49.8	52.4	67	49	26	25.9	24.9	26	38.5
August	-	43.1	79	50	22	23.3	21	28	35.4
September	-	44.5	96	49	16	23.2	22	25	38.2
October	-	56.2	89	49	24	29.9	27	30	32
November	-	66.7	69	58	27	30.5	37	34	41.2
December	-	62.1	87	55	28	38.3	50	44	49.8
January	-	62.1	94	60	32	29.6	51	60	51.9
February	60.9	51	64	46	31	27.9	55	47	48.3
March	52.8	53.6	56	31	29	23.1	48	45	45.1

Source : Annual Report 1998-99 to 2006-07,West Bengal Pollution Control Board

It is evident from the diagram (Fig. 2 and 3) that SPM and RPM tend to grow high during the colder months of the year where as levels of oxides of sulphur and nitrogen (Fig. 4 and 5) remain almost the same with a little fluctuation throughout the year.



Source: As in Table-5

Fig. 5

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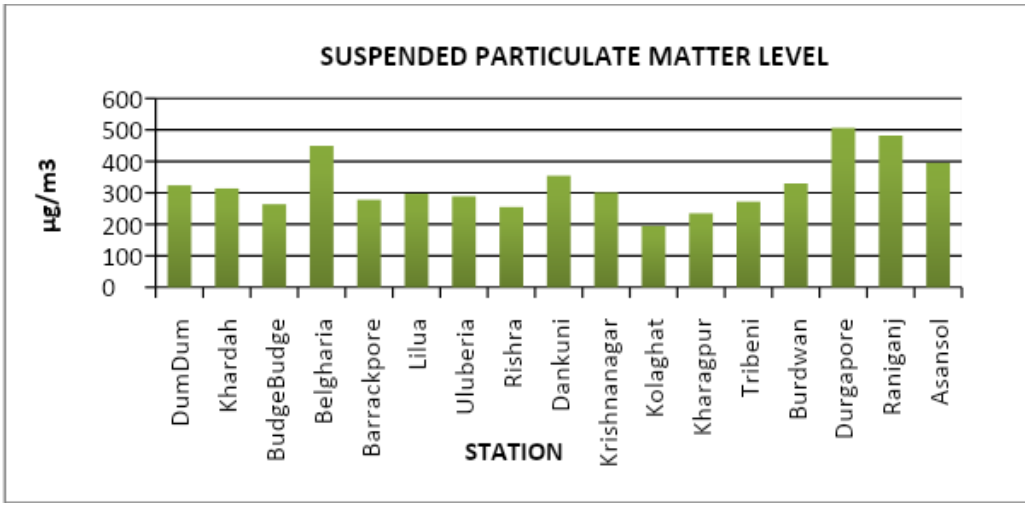
Table-6. Ambient air quality of major towns and industrial areas of West Bengal, 2003-04.

STATION	SPM (µg/m^3)	RPM (in µg/m^3)	SO_2 (in µg/m^3)	NO_2 (in µg/m^3)
DumDum	252	172	8	62
Khardah	284	206	13	70
BudgeBudge	172	107	7	42
Belgharia	261	156	12	66
Barrackpore	168	110	9	77
Lilua	270	183	24	47
Uluberia	190	121	6	39
Rishra	206	135	16	44
Dankuni	287	201	9	41
Krishnanagar	165	97	6	26
Kolaghat	248	155	6	55
Kharagpur	290	183	7	76
Tribeni	251	145	8	40
Burdwan	374	158	4	38
Durgapore	580	292	16	98
Raniganj	677	286	6	47
Haldia	123	57	7	24
Asansol	392	163	6	44

Source: Annual Report 2003-2004, West Bengal Pollution Control Board

Ambient air quality of major towns and industrial areas of West Bengal, 2003-04



(a)

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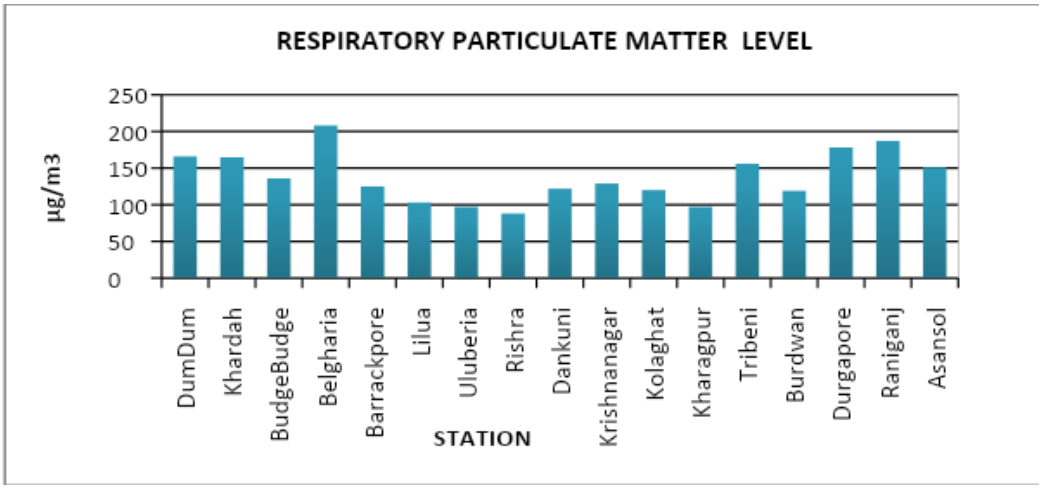
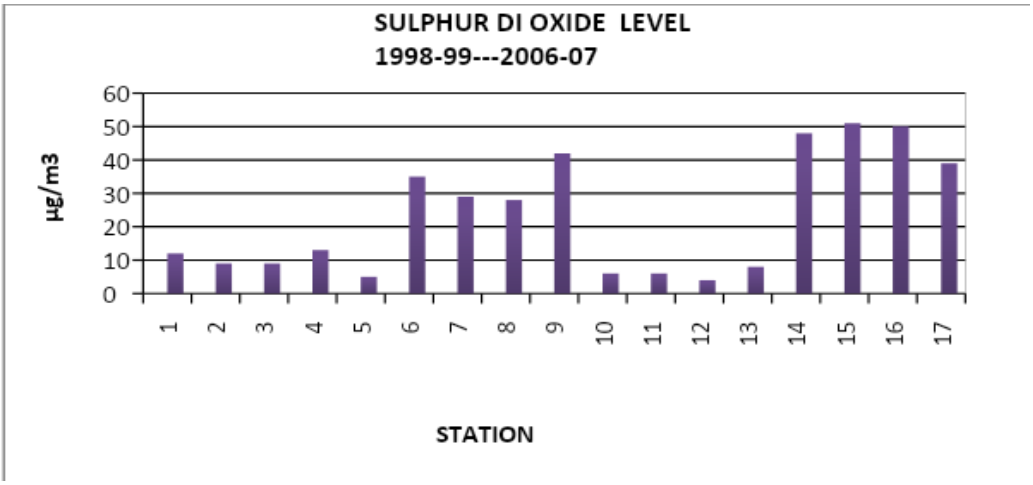
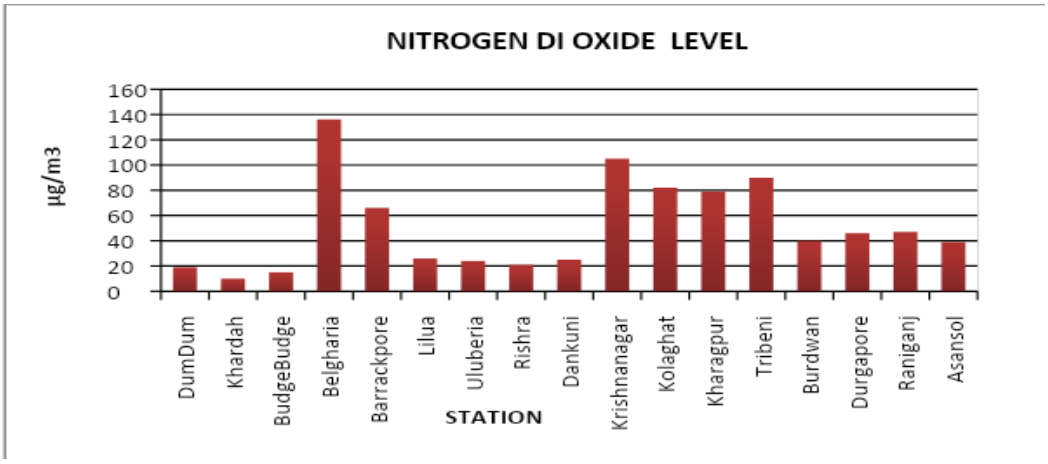


(b)



(c)



(d)

Source: As in Table-6

Fig. 6

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The air quality (Fig. 6) of major industrial areas of the State is low. It has worsened in the Asansol-Durgapur industrial belt. Kolaghat too has a degraded air quality in comparison to other industrial areas of West Bengal (Fig.6). Air quality at Haldia remains at a permissible limit.

Water is necessary for cooking, drinking and bathing, disposal of sewage, irrigation and generating electricity in power plants, cooling and manufacturing dissimilar products and the disposal of industrial wastes. During all these processes the undesirable substances are added to the water resources to a great extent.

Problem of water pollution in the industrial areas of Purba Medinipur is less acute as compared to that of air pollution. It is because most of the sources of drinking water owes much to underground sources and thus is obtained by tubewells, though the settlements along the rivers use river water for domestic purposes. Most of the rural folks use drinking water without going through proper filtration process. Thus dysentery and other water borne diseases are common health hazard throughout the rural areas of the district. The industries along the Rupnarayan river particularly at Haldia worsen the water quality by dumping the industrial waste. The industrial wastes are discharged in Rupnarayan river through flush lines of factories. The fertilizer factories, oil refineries, chemical factories emit chemical pollutants. Although many of the factories have effluent treatment plants but the un-controlled discharge of effluents and domestic sewages cause water pollution in river Rupnarayan.

Table-7. Water quality of river Rupnarayan, 1998-99 --- 2002-03.

YEAR	BOD(in mg/l)		DO(in mg/l)		TC(in MPN/100ml)		FC(in MPN/100ml)	
	HALDIA	GEONKHALI	HALDIA	GEONKHALI	HALDIA	GEONKHALI	HALDIA	GEONKHALI
1998-1999	1.6	1.1	6.9	7	180	180	180	180
1999-2000	2.2	1.5	6.6	7.2	-	-	-	-
2000-2001	3.4	1.7	6.4	6.6	-	-	-	-
2001-2002	4.1	1.5	6	6.1	216	141	64	60
2002-2003	3.3	2.4	6.7	6.4	760	180	53	33

Source: Annual Report 1998-99 to 2002-03, West Bengal Pollution Control Board

Due to presence of huge number of large scale industries the water pollution level of the river is higher at Haldia. The level of Biological Oxygen Demand (BOD) is growing year after year in the points at Haldia and also at Geonkhali. It is because the pollution level at Haldia is felt at the upstream of the river too. The level of Dissolved Oxygen (DO) remains more or less same whereas the Total Coliform (TC) and (Table-7) Fecal Coliform (FC) is higher at Haldia.

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As far as water is used to drink, it is absolutely vital that it does not contain too several coli bacteria, since this would point out the presence of other more thoughtful bacteria and viruses. The level of oxygen is a much more important measure of water quality than fecal coliform. Dissolved oxygen (DO) is absolutely necessary for the survival of all aquatic organisms. Moreover oxygen affects a vast number of other water indicators, not only biochemical but aesthetic ones such as odor, clarity and taste. Consequently oxygen is perhaps the most well established indicators of water quality.

Conclusion

Industry promotes economic growth which ultimately results in the overall development of a region. The oil refinery and the dock system have opened a new era in the district to set up innumerable industrial units by public, private and joint companies. The vast natural resource potential has immense possibilities. The large open tract and the long and narrow coastal strip might be used for industrial location. The ambient air quality and the runoff water quality of Haldia is at permissible limit. Industries are taking some necessary steps to reduce the emission of pollutants from the factories. Industrial waste water is being treated before letting go into the surface run off. At the Indian Oil Refinery in Haldia, waste water is being stored in tanks for use as fire hydrants. It is also used for beautification as fountains inside the factory site. All other factories are following this measure to reduce water pollution level in the rivers.

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