International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182 Print ISSN: 2349-5979
www.allsubjectjournal.com
Volume 3; Issue 2; February 2016; Page No. 260-263

Effect of ambient air and water pollution in Talcher: Angul industrial area: A case study

Rabindra kumar Send

Dept. of Chemistry, IGIT, Sarang, Odisha, India

Abstract
Angul district was a separate social unit throughout the British amount, however became a section of Dhenkanal district once independence. However, on first Gregorian calendar month 1993 it absolutely was graven out as a separate district. Industrial sector is enjoying a number one role for the all-around development of Angul district. Till 2008, six PSUs as noncommissioned below have the most important share in each set up and programme of the Angul district. Out of those six, three square measure giant scale enterprises have additionally started their production. But with the institution of those giant enterprisers air and pollution started poignant the atmosphere, its vegetation still because the crop lands severely. Thence there's an abnormal decrease in biomass production in Talcher- Angul region. The operation of coalfields of MCL and Thermal Power Plants of NTPC, has additional enormously to the environmental pollution. The a lot of ash generated throughout these operations within the coalfields space created environmental hazard in air, water and land, inflicting serious diseases to the labour and therefore the inhabitants. Air quality-monitoring results of commercial (Mining) and residential (village) areas adjacent to MCL Coal Fields, confirmed high degree of Suspended stuff (SPM) in mining areas and residential areas.
The mines of MCL & NTPC draw regarding twenty five crores liters of water per day from the watercourse Brahmani and reciprocally they unharness thousands of gallons of waste water to the watercourse Nandira (A tributary of watercourse Brahmani) that contains unpleasant substances like Ash, Oil, serious Metals, Grease, Fluorides, Phosphorus, Ammonia, carbamide and acid. The water of watercourse Brahmani and watercourse Kamalanga and watercourse Nandira isn't matching the prescribed limits of the pollution board. The impact of halide pollution is severe during this belt. Incidence of white spots everywhere the body, incurable skin infections and lumps of dead skin square measure increasing among the population. In this case study I even have given varied aspects and reasons behind the impact of air and water pollution in Talcher-Angul space at the side of standing of pollution management of Industries and environmental plants and water quality watching programmes for Talcher-Angul Industrial space.

Keywords: MCL, NTPC, SPM, RSPM, BOD, COD

1. Introduction
Angul lies between 20° 31′ N & 21° 40′ N latitude and 84° 15′ E & 85° 23′ E longitude. The total geographical area of Angul is 6232 sq.kms, thus it is the 11th largest district among 30 districts of Orissa. Angul shares its borders with Sundargarh in the north, Deogarh, Sambalpur & Sonepur in the west, Boudh & Nayagarh districts in the south, Dhenkanal & Cuttack in the south-east and Keonjhar in the east.
The state of Orissa is facing a huge threat from the onslaught of projects for mining of bauxite, alumina refinery and Sponge Iron plants like never before. The environment, forest and other legislations that have been promulgated to protect the rights of the local communities, their natural resource based livelihoods and the environment seem to appear too weak to achieve this objective in the face of the massive thrust for economic development from the state government.

II. Industry
The details are as follows.

Public Sector Undertakings (PSUs)
1 Mahandi Coal Fields Ltd (MCL)
At: Talcher
2 NALCO Smelter Plant
At: NALCO, Angul
3 NALCO Captive Power Plant
At: NALCO, Angul
4 National Thermal Power Station (NTPC)
At: TTPS, Talcher
5 Super Thermal Power Station,
At: NTPC, Kaniha
6 Heavy Water Plant,
At: Vikrampur, Talcher

Private Sector
M/S Sree Metaliks
Ltd Sponge iron
At: Mukundpur, Parang,
M.S. Ingots & Bars Angul
M/S Ganesh Sponge Pvt. Ltd Sponge Iron
At: Krishnachandrapur Golabandh, Angul

M/S Bindal Sponge Ltd Sponge iron
At: Sunakhani, Talcher
M.S. Ingots & Bars

Power plant
NALCO, Angul has given ancillary status to 8 SSI units and MCL has also given ancillary status to 11 SSI units. Besides, 7 of the downstream industries have been set up based on NALCO products. As per survey, 2953 SSI units are working in this district engaged in diversified activities.

After exploration of substantial natural resources at Talcher and Chhendipada, more number of investors are coming up to set up the industries in Steel and Power sectors. Eight units have signed MOUs with the government (teamorrisa.org). Many more are in pipeline for setting up projects in Steel and Power plants in Angul district.

Due to the establishment of large industries, some environmental issues have been created. There is no plan for the utilization of Fly Ash generated as a waste material from the power and other plants. No permanent solution has been found for the utilization of clinker generated in Steel Plants. Water and air are getting polluted day by day. Agriculture sector is threatened with the waste products.

Micro and small enterprises are functioning in different areas in an unsystematic way. Some of these are in residential campuses or very nearer to villages, educational institutions, hospitals and temples. The two existing industrial estates have been saturated, and given the demand for many ancillary industries for the upcoming large and mega projects, more industrial estates are required.

III. Air Pollution

With a view to ascertain the ambient air quality at various locations, a monitoring network has been established comprising of 295 stations covering 98 cities/towns in 29 States and three Union Territories under the Air (Prevention and Control of Pollution) Act, 1981, as amended in 1988. Under this programme, four criteria air pollutants viz. Sulphur dioxide (SO2), oxides of nitrogen (NOx), Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter (RSPM) are regularly monitored at all the locations. Besides this, additional parameters such as respirable lead and other toxic trace matters and polycyclic aromatic hydrocarbons are also being monitored in 10 metro cities of the country. The ambient air quality is monitored by Central Pollution Control Board (CPCB) in coordination with the State Pollution Control Boards, Pollution Control Committees and some of the universities and research institutes. The data, thus generated, are transmitted to CPCB for scrutinisation, analysis, compilation and publication as a consolidated report.

The monitoring results indicate that levels of Sulphur dioxide and Nitrogen dioxide are within the stipulated standards, whereas the levels of SPM and RSPM occasionally exceed, especially in Central and Northern parts of the country due to natural dust and vehicular emissions.

The air quality of different cities/towns for three critical pollutants has been compared with the respective national ambient air quality standards and has been classified into four broad categories based on an Exceedance Factor (EF) as calculated by the following ratio:

$$\text{Exceedance Factor} = \frac{\text{Observed Annual mean Conc. of criteria pollutant}}{\text{Annual std. for the Respective pollutant and area class}}$$

The four air quality categories are:

Critical pollution (C) : When EF is more than 1.5
High pollution (H) : When the EF is between 1.0-1.5
Moderate pollution (M) : With and EF between 0.5-1.0
Low pollution (L) : Where the EF is less than 0.5

Based upon the indicators stated above, a quarterly report is compiled by CPCB in some of the major cities. For real time data collection, automatic monitoring stations have also been established. Under the Male declaration, 11 automatic monitoring stations are also planned at strategic locations to measure the trans-boundary movement of pollutants among the South Asia Association of Region Co-operations (SAARC) Countries.

During Operation phase, activities necessary for mining of coal, its handling and processing, and transportation are taken up which were the major reasons of air pollution. Such activities having impact on ambient air quality are given below,

- Drilling – Which produces Dust
- Blasting of coal and Over Burden – Which produces Dust and noxious gases
- Handling of coal – Which produces Dust and noxious gases
- Over Burden handling – Which produces Dust and noxious gases
- Dump formation internal – Which produces Dust and exhaust fumes from dumpers and dust till the development of green cover
- Movements of vehicles – Which produces Dust and noxious fumes

The impact (both direct and indirect) are long term ones.

Mining and Environment

Coal mining at Talcher-Angul belt had encouraged rapid urbanization of rural landscape and extensive degradation of forest land. Open Caste mining which is carried out in densely populated areas, had a direct effect on human settlements and demographic endowments in Talcher area. The forest cover in the MCL mining area in Talcher was 160 Sq Km in 1975 but now the forest cover is only 54 Sq Km which indicates that there was loss of 106 Sq Km of natural forest due to mining(Action Plan for District Action Group by Indian Environmental Society).

According to the Audit Report (Civil), for the year ended 31st march 2001 by Forest and environment Department, the open cast mines of MCL at Talcher area (Kalinga, Bharatpur, Ananta, Jagannath and Balanda) are operating without complying with consent conditions and non-operation of air pollution control measures such as dust extraction system in their Coal Handling Plant. OPCB failed to take penal action under Section 31 A of the Air Act, 1981.

Air quality-monitoring results of industrial (Mining) and residential (village) areas adjacent to MCL Coal Fields, Talcher revealed high degree of Suspended Particulate Matter (SPM) ranging between 408 mg/ nm3 and 575 mg/ nm3 in mining areas and 311 mg/ nm3 to 468 mg/ nm3 in residential areas where as state Pollution Control Board, Orissa has fixed the normal SPM limit to be 150 mg/ nm3.

Monitoring results (one time monitoring) of Orissa Pollution Control Board at Talcher by pass Chowk in 2003-04 showed that Suspended Particulate Matter (SPM) concentrations in air in the morning and evening hours was as high as 1032 mg/ nm3 and 2554 mg/nm3 (24 hours average) which were attributed by OPCB to mining activities (“Save Brahmani”, News Letter of district Industrial Pollution Control& Citizens Action Project, Dhenkanal, Angul). Government also stated

that most of the mines had adequate pollution control measures and violations observed were temporary in nature which could be redressed with better management and it was not considered necessary to invoke the provision of Section 31 A of Air Act. The reply was not tenable since the mines were allowed to continue without consent even though ambient air quality in respect of SPM did not meet the prescribed standard.

IV. Water Pollution

There are three distinct sources for water Pollution from MCL Coal mines at Talcher belt. First source is the Mine seepage water containing only "Suspended solids" as impurity. Second source of effluent is the washing of HEMM in the workshop which contains mainly suspended solids, Oil and Grease and Chemical Oxygen Demand (COD). The third source of effluent is the domestic waste water.

Identification of the source of water pollution

The likely sources of water pollution from the Jagannath Colliery of MCL along with the types of pollutants are,

- Sanitary (domestic) wastewater – Which contains BOD and suspended solids (The domestic water which is again gets filled with suspended coal powder, ash etc. which generally floats in the air)
- Industrial wastewater from workshop - Which contains suspended solids, oils and grease
- Wastewater from mine or Mine Discharge Water - Which contains suspended solids of coal, clay and oil
- Surface runoff passing through coal stockpiles – Which contains suspended solids
- Storm water from leasehold area and built-up area – Which contains suspended solids

The River Brahmani (Its tributaries) gets about 96000 crore liter of polluted water that is discharged from the mine (MCL) every year (and on an average 10000 liter from Jagannath colliery only) in which the level of heavy metals are higher than that in industrial waste water and exceeds the limits prescribed by State Pollution Control Board (Figures in relation to the SPCB limit is given in the later part of the study). According to the board, which has monitored the water quality of the Brahmani River at several stations under the MINAR (Monitoring of Indian National Aquatic Resources) programme, the level of suspended solids in the Brahmani river water remains fairly high(Figure given in the later part of the Study) throughout the year and “very high” during the monsoon.

According to a study conducted by College of Veterinary science, OUAT, Bhubaneswar, 23.7 % of domestic animals in Talcher mining area were affected with muscular skeletal system disorder and 25% of domestic animals in Talcher mining area were affected with mouth disease. The primary study of the College of Veterinary science, OUAT indicates that most of the animal exhibited the clinical signs of respiratory system in villages near the mining area. Significantly high rates were recorded in abnormalities of respiratory system and eye.

A high percentage of gastro- intestinal parasitic infection was found in the fecal samples of cattle in the villages affected by coal mining. Microscopic examination of lung lesions of sheep and goats revealed the pathological changes like congestion and proliferation of cells, desecrate granulmas accompanying atelectasus and presence of sew-fibrinous esudetails in the alveoli(As courted in Action Plan for District Action Group, Angul by Indian Environmental Society).

Water Quality of Down Stream of the Kamalanga (A Tributary of the River Brahmani) due to MCL mining by 2000 (News Letter from Orissa State Pollution Control Board, ISSN 0971-9148),

Sl. No.	Parameters	2000	2010
1	Dissolved Oxygen(DO)	8.6	7.8
2	Biochemical Oxygen Demand(BOD)	5.3	5.9
3	Chemical Oxygen Demand(COD)	2365	16.8
4	Total Kjeldhal Nitrogen(TKN)	0.1	0.18
5	Temperature	28.3	20.6
6	Turbidity	57	114.6
7	Total Coliform(TC)	4320	1370
8	Fecal Coliform(FC)	1322	140
9	pH	5.8	12.9
10	Conductivity	22	100.6
11	Chloride (Cl)	19	56.1
12	Sulphate SO4)	11	22.5
13	Sodium (Na)	33	10.6
14	Calcium(Ca)	27.5	24.9
15	Magnesium(Mg)	17.6	2.67
16	Alkalinity	82	74.5

All parameters except Temperature, Turbidity, TC, FC, pH, Conductivity are expressed in mg/liter. The values are in annual average.

TC and FC MPN/100ml, Turbidity in TTU, Temperature in ^{0}C, Conductivity in mSm^{-1}

The fall in the ground water level has been caused by the continuous pumping out of water from the coal mines (MCL) for the last several decades. The seven existing mines of the area now discharge 24 to 47 million liters of water every day.

Mine Water Discharge from Talcher

Sl No.	Name of the Mines Existing	Total Area in Sq. Km.	Types of Mining	Coal Reserves(Million Tonnes)	Mine Water Discharges(KLD)	
					Summer & Others	Monsoon
1	Talcher	6.53	UG	58.1	571	4006
2	Dulbera	7.15	UG	28.16	590	590
3	Handidhua	2.13	UG	5.2	36 1308	36 9806
4	Nandira	5.19	UG	36.7	1470	1470
5	Jagannath	4.89	OC	134	572 40	5148 40
6	South Balanda	2.27	OC	34.6	3200 15	10869 15
7	Ananta	4.0	OC	258.9	204 40	4412 40
8	Bharatpur	6.76	OC	133.2	1090 50	1090 50
9	Kalinga	8.21	OC	347.67	1098	7640

V. Effects

There were 568 cases of TB,223 cases of pnemuololeosis, 267 cases of pocket cancer, 340 cases of dermatitis, 567 cases of asthma attack and thirty eight cases of Lungs and Bone Cancer were rumored within the year 2004-05 that was as a results of pollution in Talcher owing to combined activity of MCL and NTPC. Conjointly there have been 657 cases of disease of the skin and 617 cases of itch owing to pollution in mines affected space. Within the MCL Mining space of Talcher, there have been 267 cases of accidental borne rumored (Including the mine employees and civilians). Within the edge of ten kilometre of TSTPS (NTPC), there have been 467 of cows deaths rumored owing to pathology, teeth and gum.

VI. Conclusion

Air and pollution, a demon created by grouping, will cause consequences lasting from hours to decades. It's become a heavy and growing drawback in quickly increasing cities of India wherever unprecedented and unplanned urbanization in the middle of speedy conveyance growth ar among the foremost factors that exacerbate air quality. In the paper work, I actually have given the result and reasons in addition as sources of close air and pollution in Talcher-Angul Industrial Sectors of Odisha State. Use of autochthonic plants as pollutants absorbent is usually recommended to mitigate and manage this drawback within the property urban development views. It's conjointly counseled that additional efforts ought to be created to grasp the dynamics of urban environmental issues.

VII. References

1 Pattanaik SC. A study of present status of waste materials in the state of Orissa for utilization in making a green building. InAll India Seminar on Eco Friendly Materials and Techniques for Green Building Technology, Institution of Engineers (India), Berhampur Local Centre, Orissa, 2010, 13-15.

2 Jha N. Coal Mining and Rural Ecology: A Study in Talcher, Odisha (Doctoral dissertation, National Institute of Technology Rourkela), 2015.

3 Firdaus G. Urbanization and Changing Air Quality in Delhi–A Comparative Analysis and Strategy for Its Better Management. Asian Journal of Water, Environment and Pollution, 2011; 8(1):23-31.

4 Marquand CJ, McVeigh JC, Sehgal S. Dissemination of renewable energy technologies in developing countries—lessons for the future. International journal of ambient energy. 1998; 19(1):3-32.

5 Seminar APO. Sustainable mineral development and mmdr bill, 2012, 2011.

6 Sinha S, Goswami S. A frame work for development of sustainable indicator specially suface mines. International Journal of Physical and Social Sciences. 2015; 5(1):80-100.

7 Hedger M, Vaideeswaran S. Action on climate change in Orissa: scoping report. Brighton: Institute of Development Studies. 2010.

8 Marquand CJ, McVeigh JC, Sehgal S. Dissemination of renewable energy technologies in developing countries—lessons for the future. International journal of ambient energy. 1998; 19(1):3-32.

9 Seinfeld JH, Pandis SN. Atmospheric chemistry and physics: from air pollution to climate change. John Wiley & Sons. 2012.

10 Shao M, Tang X, Zhang Y, Li W. City clusters in China: air and surface water pollution. Frontiers in Ecology and the Environment. 2006; 4(7):353-361.

11 Künzli N, Kaiser R, Medina S, Studnicka M, Chanel O, Filliger P, *et al*. Public-health impact of outdoor and traffic-related air pollution: a European assessment. The Lancet, 2000; 356(9232):795-801.

12 Dockery DW, Schwartz J, Spengler JD. Air pollution and daily mortality: associations with particulates and acid aerosols. Environmental research, 1992; 59(2):362-373.

13 Schwartz J, Dockery DW. Increased mortality in Philadelphia associated with daily air pollution concentrations. American review of respiratory disease. 1992; 145(3):600-604.

14 Cohen AJ, Ross Anderson H, Ostro B, Pandey KD, Krzyzanowski M, Künzli N, Smith K. The global burden of disease due to outdoor air pollution. Journal of Toxicology and Environmental Health, Part A, 2005; 68(13-14), 1301-1307.