

RNI MAHIMAR

36829-2010

ISSN- 2229-4929

Peer Reviewed

Akshar Wangmay

International Research Journal
UGC-CARE LISTED

Special Issue - I
Environmental Changes, Biodiversity And Sustainable
Resource Management

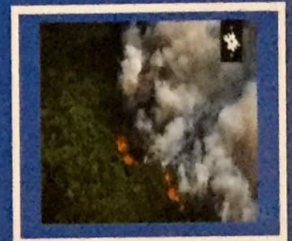
September 2020

Executive Editor : Prin. Dr. B. M. Bhanje

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On

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PRATIK PRAKASHAN, 'PRANAV, RUKMENAGAR, THODGA ROAD AHMEDPUR,

DIST. LATUR, -433515, MAHARASHTRA

Published by - Dr. B. M. Bhanje, Principal, Santosh Bhimrao Patil Arts commerce & Science College, Mandrup

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Price :Rs.1000

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An Assessment of the Ecological Consequences of Industrialized Urban expansion of Kolhapur City Maharashtra

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Abstract:

Present assessment is a case study of Kolhapur city in Maharashtra. This assessment is stand on secondary sources of data. In this research paper, an attempt has been made to understand the ecological problem due to urbanization and industrialization and its impact on livelihood in Kolhapur city and actions to be taken to compact with this predicament effectively. Industrial pollution is one of the majority leading causes of public health concern and mortality. Water and Air pollution is the result of urbanization and overpopulation. Water and Air pollution is caused due to high consumption of chemicals from industries in the city. The polluted water and air has led to increase some treacherous diseases like Diarrhea, jaundice, gastro and fever in the city. Therefore; there is need of public awareness and government implications and policies.

Key Words: Pollution, Health, Ecology, Urbanization, Kolhapur.

Introduction:

The environment in large urban areas has deteriorated and resulted in an increased incidence of diseases and ailments. The effects of urban development can be defined by many factors. The most important of these factors relate to air quality, the availability of safe water supplies, and provisions for sanitation and waste management. Smog hanging over cities is the most familiar and obvious form of air pollution. But there are different kinds of pollution—some visible, some invisible—that contribute to global warming. Generally any substance that people introduce into the atmosphere that has damaging effects on living things and the environment is considered as air pollution.

Ambient air pollution in an increasingly urbanized world directly threatens the health of a large fraction of the world's population. There is a growing recognition that air-borne emissions from major urban and industrial areas influence both air quality and climate change on scales ranging from regional up to continental and global. Deteriorating urban air quality affects the viability of important natural and agricultural ecosystems in regions surrounding highly urbanized areas, and significantly influences regional atmospheric chemistry and global climate change. This challenge is particularly acute in the developing world where the rapid growth of megacities (cities having population equal to or more than 10 million) is producing atmospheric pollution of unprecedented severity and extent. Kolhapur in Maharashtra is fast growing II tier city in terms of Industrial Development, Co-operative movements, growing number of Agro based industries, leather industries and of course, tourism for which the city is all known. Hence, the present study was carried out in Kolhapur city to estimate and analyze chemically trace metals in SPM at Kolhapur City,

which constitutes a long term threat to the health of general population. The results of source apportionment will be taken to appropriate dispersion model for accurate forecasting. The modeling and simulation will help urban planners and air quality planners for zoning policy decision making.

Study Area:

Kolhapur city is located in south-western Maharashtra at 16°42'N 74°13'E. It has an average elevation of 545 meters (1788 ft). The geographical area of the district is 7685 Km². Kolhapur is situated on the banks of river Panchganga. The population of Kolhapur city was 549236 as per the 2011 census.

The city has become industrialized, due to the proximity of bauxite deposits. There are two main industrial areas, Gokul Shirgaon and Shirol. These mainly produce such products as aluminum castings, alloys, and bearings. The Shivaji Udyamnagar area is famous for electrical and other metal fabrication workshops which are situated at centre of the city. The Shahu Textile Mill is also located inside the city. The Kagal-Hatkanangale industrial area namely 5-star MIDC is situated 12 km from Kolhapur city and contains lots of very big budget companies. Kolhapur is known for Art, Education, Industry, Sports specially wrestling. There is Shivaji University in Kolhapur and all colleges from south Maharashtra are affiliated to it. There are two industrial estates at Shirol & Gokul Shirgaon near Kolhapur and the city is world famous in foundry industry.

Objectives:

1. To identify the locations for assessment of use and wastage of water
2. To assesses agrochemical uses in the industries of study area.
3. To measure air quality at selected locations for the study
4. To study the health issues due to pollution
5. To suggest methods and procedures for minimization of trace elements at selected locations

Subjects and Methods:

The methodology as per standard protocol and laboratory practices was adopted to carry out experimental work as well as calculations of results to arrive at conclusions. Selection of three locations viz. Urban area like Shahu Blood Bank Corner on downwind direction of the city, Industrial area like Shirol MIDC and Gokul Shirgaon MIDC, both on upwind direction of the city was done and collected wind data at these locations to build Wind rose to know the predominant wind direction and wind speed to be used for dispersion studies.

Results and Discussion:

Pollution in study area comes from a wide variety of sources. The single most important source for the classical pollutants viz. sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOCs), and particulate matter (PM) is generally the combustion of fossil fuels. Air pollution is recognized as a major threat to human health. The United Nations Environment Programme has estimated that globally 1.1 billion people breathe unhealthy air (UNEP, 2002). Epidemiological studies have shown that concentrations of ambient air particles are associated with a wide range of effects on human health, especially on the cardio-respiratory system (Baldasano, J.M., Valera, E., Jimenez, P. et al. 2003). Direct effects of air pollutants on plants, animals and soil can influence the structure and function of ecosystems, including their self-regulation abilities, thus affecting

the quality of life. Trace elements are released into the atmosphere by human activities, such as combustion of fossil fuels and wood, high temperature industrial activities and waste incineration. The combustion of fossil fuels constitutes the principal anthropogenic source of Ba, V, Co, Ni, Se, Mo, Sn, Sb, and Hg, and particularly of Cr, Mn, Cu, Zn, and As. High percentages of Ni, Cu, Zn, As, and Cd are emitted from industrial metallurgical processes.

Exposure to air pollution is associated with numerous effects on human health, including pulmonary, cardiac, vascular, and neurological impairments. The health effects vary greatly from person to person. High-risk groups such as the elderly, infants, pregnant women, and sufferers from chronic heart and lung diseases are more susceptible to air pollution. Children are at greater risk because they are generally more active outdoors and their lungs are still developing. Exposure to air pollution can cause both acute (short-term) and chronic (long-term) health effects.

Table No.01 Use and Wastage of water

Panchgang a River Basin	Population (2011 Census)	Total No. Industries	Usage of water per day	Waste water
	5.94 lakhs	3586	188 Million Liters	130 Million Liters

(Panchganga Basin Pollution study report)

Table 02: Agrochemical Uses in the Industries

Sr. No.	Type of agrochemical	Solid state (per year)	Liquid State (per year)
1	Chemical fertilizers	98,567 Tones	-----
2	Pesticides	1,89,245 Tones	34,578 liters
3	Weedicides	55,102 Tones	19,875 liters
4	Fungicides	8078 Tones	3456 liters

(Source: District Agriculture Department, Kolhapur)

Table 03: Air Quality in Kolhapur City (2018)

Months	Dabholkar corner				Mahadwar road				Shivaji university campus			
	SO ₂	NO _x	RSPM	SPM	SO ₂	NO _x	RSPM	SPM	SO ₂	NO _x	RSPM	SPM
Standards (CPCB)	80	80	100	200	80	80	100	200	80	80	100	200
Jan	11.53	25.31	119.0	259.2	8.59	12.34	99.18	215.8	4.69	6.30	45.8	101.3
Feb	13.3	32.80	122.8	272.2	8.82	13.44	79.36	198.6	6.21	8.04	55.6	130.8
March	20.57	40.78	104.8	361.6	15.62	24.71	114.72	247.3	10.93	13.21	62.0	130.5
April	19.68	41.55	105.0	342.8	16.47	27.22	110.40	211.3	10.12	13.39	60.5	130.5
May	24.67	43.20	107.0	331.9	17.64	28.96	174.77	212.7	11.33	14.13	56.6	125.9
June	19.77	36.80	77.08	219.3	12.46	21.88	115.92	142.6	10.20	13.33	45.8	100.9
July	15.17	31.55	15.17	23.36	9.46	17.36	16.47	119.9	6.95	11.78	47.9	101.2
August	10.36	15.79	59.16	123.3	6.43	9.97	56.31	117.2	4.17	5.66	40.1	83.11
Sept	10.51	15.72	74.56	159.3	6.37	9.69	57.33	227.3	5.03	7.26	49.8	105.4
October	14.48	22.90	108.5	273.2	11.21	15.16	100.6	227.3	7.21	11.10	68.0	143.1
November	17.27	23.27	114.2	310.0	11.78	17.05	103.5	250.9	6.95	11.78	67.2	145.3
December	16.79	24.60	106.2	316.0	12.15	17.64	91.63	228.7	8.55	12.76	67.7	147.4
Total	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min
	10.36	15.72	15.17	23.36	6.37	9.69	16.47	117.2	4.17	5.66	40.1	83.11
Total	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max	Max
	24.67	43.2	122.8	361.6	17.64	28.96	174.77	250.9	11.33	14.13	68	147.4

(Source: Maharashtra Pollution Control Board, Mumbai)

SO₂ Sulphur dioxide, NO_x: Nitrogen oxides, SPM: Suspended Particulate Matter, RSPM: Radical Sulphur Particulate Matter, CPCB: Central pollution control board

Table 04: Health Issues Due to Pollution

Year	Jaundice	Diarrhea	Dysentery	Gastro	other
2016	187	286	57	412	57
2017	197	305	78	512	68
2018	204	328	96	610	80
2019	237	360	105	587	102

(Source: Civil Hospital, Kolhapur)

Increased developmental activities due to urbanization and industrialization are greatly responsible for water pollution in Kolhapur city. There are many causes of water pollution such as sewage disposal, excess use of agrochemicals in the field, discharge of industrial effluents without treatment, disposal of urban solid waste, agricultural runoffs etc. The polluted water of *Panchganga* is creating some serious public health issues in the city. Kolhapur city is one of the developed cities in the state Maharashtra. Thousands of people are coming to Kolhapur for seeking employment from across the India. The industrial sector is growing very rapidly. This city is also characterized as a famous religious place; therefore plenty of pilgrims visit it every year. The population of this city is increasing so fast due to educational facilities, employment and service. Today and probably in the future; due to the rapid growth in population, urbanization and industrialization; public health issues will be a great challenge before the planners, administrators and politicians. The river as a drinking source is becoming polluted and the capacity of treatment plants is not enough to stop the pollution and reduce the damage on public health. The capacity of these plants needs to be increased. Therefore; there is a need to wake up as early as possible to be prepared to tackle the growing issue of water pollution to promote public health. There is a need of government intervention with active peoples' participation.

The two major contributors to the atmospheric particulate matter at Kolhapur are Transportation sector and the Industrial emissions. The SPM contributions from transportation sector can be effectively controlled by taking measures like Engine Modifications, Fuel substitution and Use of Catalytic Converters while the contributions from industrial sector can be controlled by adapting Process changes, Good operating practices, Source control, Use of air pollution control equipments, and Dispersion at higher levels, etc. Majority of the roads in Kolhapur are two way in nature and always congested due to improper master plan by Urban Development authority. One-way roads shall serve the purpose of reducing air pollution from automobiles. Unfortunately, Industrial MIDCs like Gokul Shirgaon and Shirolu are located on upstream of Kolhapur city. The city is always receiving the released air pollutants coming from these industries. The release of air pollutants from stack comes to city with wind direction facing towards city. The downstream of Kolhapur city is surrounded with higher mountain range of Sahyadri. The pollutants rebound and comes to Kolhapur city. The valley city like Kolhapur shall have air pollution disaster and hazard in near future if appropriate authorities do not take proper measures

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