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Remarking An Analisation Industrialization and Its Impact on Environment: A Case Study of Water Pollution in Bikaner District (Rajasthan)

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Abstract

Like so many other things in life, industrialization is a mixed blessing. It is essential to make an economy diverse, strong and more productive. A diversified economy is more stable and productive.Value-addition through industrial processing also makes economy more productive and remunerative.The economy enables to absorb more people in the employment sector.Tertiary sector, which has been considered as the last stage of evolution of economy by many, is most productive when a strong industrial sector precedes the development of formal service sector.Despite the economic significance of industrialization, there is a dark side to it also. Large scale , automated production in the industries, coupled with excessive growth rate of population necessitates intensive exploitation of water resources. Water pollution affects surface, ground water and oceans through various possible means like organic overloading, heavy metals and poisonous chemicals. Sewage discharge and food industry cause organic pollution and probabilities of disease affliction which leads to serious health problems.

Keywords: Industrialization, Economic Significance, Intensive Exploitation, Water Pollution.

Introduction

Industrial production in a region is dependent upon its various levels of resourcefulness, human development and organizational skills (Warhurst, Alyson 1994). The raw materials for the industries are obtained directly from the earth's interior in the form of minerals, from the natural vegetation, or from the domesticated animals or plants, i.e. livestock rearing and agriculture.

In the study area, economic scenario began to change after extension of irrigation following electrification which has transformed the status of agricultural activities. Most of the industries are reported to be the development of the last two decades or so. Livestock rearing has been commericalised as a result of infrastructural development. Mineral wealth is utilized in clay-based industries producing goods mainly for construction activities, and now in thermal power plants. Industrialisation has based itself upon agricultural and livestock products, and mineral resources in Bikaner district.

Aim of the Study

1. To evaluate the water pollution due to industrial activities in the study area.
2. To suggest measures for development of environmentally balanced industrial activities.

Hypothesis

The industrial growth and improper disposal of industrial affluents have increased environmental pollution in Bikaner district.

Study Area

Bikaner district spreads over an area of 30289.62 km^2 and lies in the north-north western part of Rajasthan. It is located between 27°11' and 29°03' north latitudes and 71°54' to 74°12' east longitudes. It is bounded by Sriganganagar district in the north, Pakistan in the west, Jaisalmer and Jodhpur districts in south-west, Nagaur district in the south and Churu and Hanumangarh districts in the east and north-east. Its international boundary with Pakistan is 170 km. The location of the study area is shown in figure 1.

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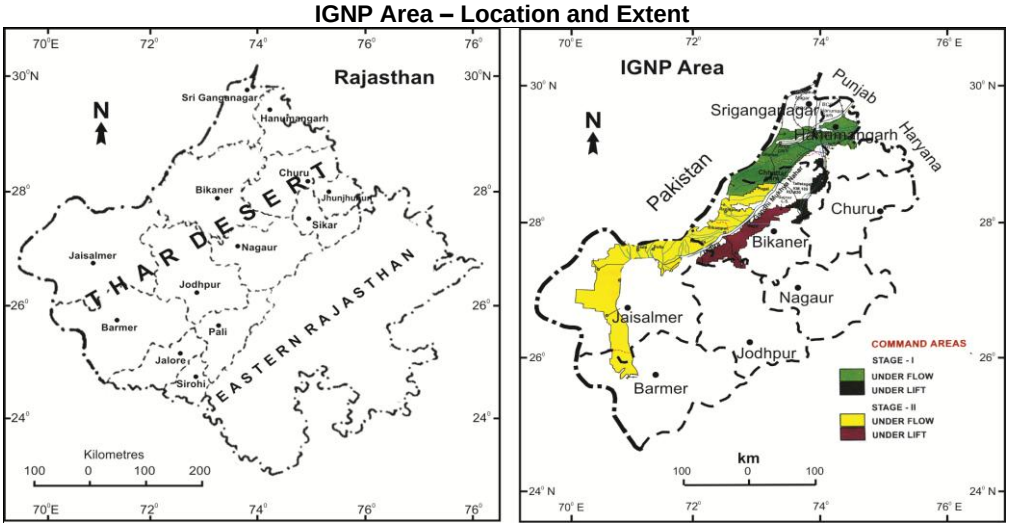
Remarking An Analisation

Fig. 1
IGNP Area – Location and Extent



Methodology

The present study is based on primary as well as secondary sources of data. The data and information regarding type of industries, employment, infrastuctue etc. have been collected from various secondary souces like District Statistical Outline, District Industrial Centre and RIICO. Environmental Impact Assessment (EIAs) reports of various mines have been collected from Rajasthan State Pollution Control Board, Bikaner. In order to generate information, and to know the perception of people regarding industrial pollution scenario, a schedule-based field survey has been conducted amongst people living near industries. A total of 200 respondents have been selected for the purpose representing various industrial areas or units located in the study area. Out of the total respondents, 18 lived within a range of 1-2 km from the industry, 74 within a range of 2-3 km, and 108 at a distance of minimum 3 km from industry. The obtained data and information have been classified and tabulated in order to make the presentation more effective, cartographic techniques i.e. maps and diagrams have been used.

Industrial Wastewater Pollution

During the processing of raw material in the industries, water may be used which results in generation of industrial wastewater. This wastewater may contain solid or liquid constituents, which may harm the eco-system or the human beings. Rasgulla and bhujia industries cause organic pollution of water due to organic liquid effluents released in the process of its manufacture. Woolen industries release liquid chemicals, used in the purification and processing of raw wool into pure wool used for making woolen yarn. Dyeing and printing, rasgulla and bhujia, and cotton and woolen yarn making industries release heavy metals into the waste water. Out of the total respondents, 44.5 per cent replied that rasgulla and bhujia, woollen, dyeing and printing industries are responsible for very high level of pollution whereas 34 per cent responded for medium level and 21.5 per cent replied that there is low level of pollution in the study arae (table 1).

Table 1
Bikaner District - Level of Water Pollution

Level /Status	Respondents	Percent
Low	43	21.5
Medium	68	34.0
High	89	44.5

Source: Field Survey Conducted During 2014-15

It can be seen that Total Dissolved Solids, COD and BOD in the industrial areas of Bikaner City have indicated very high level of pollutions i.e. physical, chemical and biological. Total hardness, chloride, nitrogen, Ca, Mn, Fe and toxic heavy metal pollutant (Pb) also showed high concentrations. Another dangerous heavy metal (Cd) has also tended to be high.

Colour of Polluted Water

Polluted water may be of particular colour, which depends on the nature of raw material used in the manufacturing process. The wastewaters from Papad, Rasgulla and Mawa industries were reported to be of dirty colour by most of the people (41.5 per cent). Coloured waste water was noticed by some people for salt industry, while black wastewater was noted by other few persons for thermal power stations (table 2).

Table 2
Bikaner District - Colour of Polluted Water

Colour	Respondents	Percent
Normal	46	23.0
Turbid	83	41.5
Black	71	35.5

Source: Field Survey Conducted During 2014-15

Impurities in Polluted Water

Impurities in wastewater vary from physical to chemical and biological. Out of total respondents 31.5 per cent replied that physical impurities accomplish wastewater in wool, blanket and Fire clay industries while chemical impurities are noticed from salt, Ball clay and Plaster of Paris industries.It responded (39.5 per cent) that biological pollution is mainly caused by ragulla and papad-bhujia industries

(table 3).

Table 3
Bikaner District - Type of Industrial Wastewater

Wastewater Type	Respondents	Percent
Physical	63	31.5
Chemical	58	29.0
Organic	79	39.5

Source: Field Survey Conducted During 2014-15

Wastewater accumulation due to industries can cause degradation of soil. When it percolates down to groundwater table, the groundwater quality itself gets degraded. In the condition of degraded soil and groundwater, the vegetation and crops go waste. These may not even grow in too acidic, too basic or poisonous soils and waters. Most of the information reported soil degradation due to wastewater. Lesser percent of opinion sharers enumerated ground-water degeneration, while a few people pointed towards vegetation and crop degenerations as wastewater effects. Soil degradation was seen to be caused by woolen industry, Plaster of Paris and thermal power plant.

Odur of Polluted Water

Industrial processing involves various types of raw materials which range from agro-animal based to mineral based. Different types of raw materials emit their respective odours. Higher amount of processing increases the amount of odour. Some odours are very intense and unpleasant while others may be suffocating. The level of odours emitted from industries in Bikaner district is shown in table 4. Small scale industries i.e. Papad-bhujia have been reported to be emitting low odour (4.00 per cent), but such low-odour industries are very few. Most of the industries have been (54.00 per cent) reported to be causing medium level odour pollution. Included in this category are Guwar Gum, Spice milling, Dal mills, Plaster of Paris etc. industries. High level of odour caused by industries has a large proportion too. Ball and Fire clay mills, Rasgulla, thermal power stations, pipe manufacturing and plastic industries are included in this category (42.00 per cent). It has been observed during the field survey that there is very high level of odur near rasgull and papad-bhjia plants in Bichhwal and Rani Bazar industrial areas.

Table 4
Bikaner District - Level of Odour from Industries

Level of Odour	Respondents	Percent
Low	8	4.00
Medium	108	54.00
High	84	42.00
Total	200	100.00

Source: Field Survey Conducted During 2014-15

Odours emitted from the industries are not always continuous in nature. Intense and bad odour emitting industries are felt more zealously and consistently, while less intense and odour releasing industries are not perceived and may go un-noticed. Ball and Fire clay mills, Dal mills, Mawa, Guwar Gum, Plaster of Paris industries are among from which odour is perceived more consistently as replied by majority of respondents (71.40) whereas Papad-bhujia, Rasgulla, Bricks and Salt industries sometimes emit the odour.

Table 5
Bikaner District - Consistency of Odour Emitted by Industries

Consistency	Respondents	Percent
Sometimes	60	28.60
Always	150	71.40
Total	210	100.00

Source: Field Survey Conducted During 2014-15

Different types of odours are released due to various chemical constituents found in the matter under processing and accordingly they have variable effects on human being. Unpleasantness and vomitting have been reported to be the major problem (33.50 per cent) in the industrial areas. The industries involved are plastic, spice, mawa, papad-bhujia, rasgulla and Plaster of Paris, brick, thermal power plant and fire clay, while suffocation was reported for Plaster of Paris, bricks, Ball clay and Plaster of Paris industries. Painful sensations have been reported in Guwar Gum, Plaster of Paris, blanket, papad-bhujia and rasgulla units (20.50 per cent).Suffocation has been felt by some people near papad, Guwar Gum and dal mills.

Table 6
Bikaner district - Effect of Emitted Odours from Industries

Effect Type	Respondents	Percent
Suffocation	46	23.00
Painful	41	20.50
Burning	28	14.00
Unpleasantness/ Vomitting	67	33.50
Negligible	18	9.00
Total	200	100.00

Source: Field Survey Conducted During 2014-15

Disposal of Polluted Water

The wastewater from the industries should, ideally, be collected, treated and then only discharged. Such disposed of wastewater is safe for environment and health. However, the treatment of wastewater involves a high amount of investment. Many industrial units (22.00 per cent) are found to discharge their wastewaters without treatment outside to the industrial areas (table 7). However, in a large number of cases (36.50 per cent), the discharge of wastewater is done just outside the factory. In some conditions, industrial wastewater is discharged into the drains (15.50 per cent).

Table 7
Bikaner District - Discharge of Industrial Wastewater

Discharge Area	Respondents	Percent
Drains	31	15.50
Outside Factory	73	36.50
Outside Industrial Area	44	22.00
Not Applicable	52	26.00
Total	200	100.00

Source: Field Survey Conducted During 2014-15

Effects on Human Health

The accumulation of polluted water also has negative effects on human health. Most of the people,

indicated towards dysentery, cholera and malaria followed by typhoid as top most impacts of wastewater. The second rank was assigned to cholera, malaria while at third rank; malaria and typhoid is the main diseases caused by polluted industrial water. The disease ranked at fourth place was typhoid. The survey, thus, indicates that dysentery and cholera have been the common diseases prevelant in the industrial areas in Bikaner district.

Table 8
Bikaner District - Effects of Pollution on Human Health

Disease	No. of Responses			
	Rank I	Rank II	Rank III	Rank IV
Cholera	49	73	42	36
Malaria	27	60	66	47
Typhoid	23	43	48	86
Dysentery	76	54	44	26

Source: Field Survey Conducted During 2014-15

Controlling Measures of Water Pollution

Control of pollution is a necessity for the sustenance of all life and good health. It is equally necessary, perhaps, to maintain our industrial growth and development. Conflicts between industrial development and pollution needs to be resolved so as to save environment, life, health and to ensure employment and economic growth (Warhurst, Alyson, 2003). In this reference, there are varoius views. One of them is the technocrats' view which emphasizes upon development and use of technology. Such as technology will use such efficient processes as will generate a little or no pollution and will consume lesser energy while producing more. The other extreme view is an administrative view which believes in taking action against the polluter so that he either stops emitting pollutants to the environment or gets banned from producing the goods altogether till the use of safer processes.

Majority of the respondents (46.00 per cent) has stressed on use of cleaner production technology, 43.50 per cent favoured ban on the polluter industrial units while 10.50 per cent of them satisfied with the present situation and advocated not to ban such industrial units as they afraid of leaving their jobs and some of them were residing at some farther distance.

Table 9
Bikaner District - Suggested Controlling Measures

Measure	Frequency	Percent
Clean Production Technology	92	46.00
Ban Polluters	87	43.50
No Need to Ban (Satisfied)	21	10.50
Total	200	100.00

Source: Field Survey Conducted During 2014-15

Conclusion

Control of water pollution is a necessity for the sustenance of all life and good health. It is equally necessary, perhaps, to maintain our industrial growth and development. Conflict and dilemma between these two imperatives needs to be resolved so as to save environment, health and to ensure employment and economic growth by entrepreneours and government levels. Emphasis should be given on development and use of cleaner technology for industrial production which will ensure little or no pollution.

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