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## Impact of paper industry on Environment: A case study from Rajamundry, Andhra Pradesh, India

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### Abstract

Pulp and Paper industry has been considered as one of the major polluting industries in the world. The study found that independent variable with significant impact on environmental integrity and economic prosperity was number of countries / states operating in. The independent variables with significant impact on social equity and overall sustainability were number of countries/states operating in and number of fines / penalties / court cases. Though the mill has positive externalities from the point of view of employment and income opportunities, urbanization and concentration of commercial activities and property price appreciation, it has also negative externalities that are environmental pollution which arises from the operation of the mill. This paper attempts to investigate the environmental impact of paper production of the paper mill on agriculture and health.

**Keywords:** Environmental Impact Assessment, Sustainable development.

### 1. Introduction

Industrialization is necessary for the economic development of a country. Apart from directly contributing to income and employment generation, industrialization induces output and employment growth indirectly through its linkages with other sectors. However, industrialization can also lead to worsening of environmental conditions. This is mainly for two reasons. First, industry uses natural resources as raw materials, that is, there is larger scale of natural resource exploitation. Secondly, it also generates pollution and degrades the environment which may also reduce the productivity of people and industrial units create the problem of negative externalities leading to inefficiency and market failure.

### 2. Review of Literature

The pulp and paper industry is a chemical process industry with major impact on the environment. The potential pollutants from a pulp and paper mill can be classified into four categories— liquid effluents, air pollutants, solid wastes and noise pollution (Mohanty & Srivastav, 1998) <sup>[1]</sup>.

The major pollutants in a pulp and paper industry are the various gases like sulfur compounds and nitrogen oxides emitted to the air, and chlorinated and organic compounds, nutrients and metals, which are discharged to the wastewater. Pulp and paper production, consumption and wasting have many negative environmental and social impacts. The pulp and paper industry is among the world's largest generators of air and water pollutants, waste products and the gases that cause climate change. It is also one of the largest user raw materials including fresh water, energy and forest fibers.

Pulp and paper mills use and generate materials that may be harmful to the air, water and land. The pulp and paper industry is the largest industrial process water user in the U.S. (U.S. department of Commerce, 2000). A typical pulp and paper mill used 4000-12000 gallons of water per ton of pulp produced in the US.

Pulp and Paper industry has been considered as one of the major polluting industries in the world (Sharma N & Chakravarty H, 2008). Pulp and paper mills pollute water, air and soil. The pulp and paper industry is the third most polluting industry in North America. Gopalaratnam N (1996) points out some of the important environmental issues associated with the paper industry <sup>[2]</sup>. These issues are- Large use of water and discharge of coloured effluent, presence of chlorinated by products in the effluent system, odour control, acid

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deposition and stack emission, solid waste. He further mentions that paper industry is also responsible for denudation of forests. Ghosh & Ghosh (2008) stated that pulp and paper mills have been categorized amongst one of the major energy intensive and highly polluting [3].

### 3. Andhra Pradesh Paper Mills Limited

Established as Carnatic Paper Mills Ltd in 1921 the Company was incorporated on 29th June 1964 as "The Andhra Pradesh Paper Mills Ltd." at Rajahmundry. Andhra Pradesh Paper Mills, which is now an International Paper company, is one of the biggest integrated paper and pulp manufacturing centers in India [4]. The company produces indispensable writing, printing and copier papers for foreign and domestic markets. It employs around 2,500 employees and is headquartered in Hyderabad. Andhra Pradesh Paper Mills Limited's production facilities are comprised of two mills in Rajahmundry and Kadium with a total production capacity of 240,000 TPA [5]. The company is becoming a driving force in sustainability in

the paper manufacturing arena through focused social and community programs, including pioneering work in raw material generation through social farm forestry.

The Andhra Pradesh Paper Mills Ltd., is located at Sreeram Nagar, Rajahmundry, East Godavari District, Andhra Pradesh. The site is located at the intersection of the coordinates East 81° 46' 20" and North latitude 17° 01' 41" with an elevation of 26.5m. The land area of the plant is 123.86 acres. River Godavari is flowing from northwest to south direction and passing at a distance of 0.7 km from the plant site. The nearest human settlement from the site is Rajahmundry. Rajahmundry Railway station (SC Railway) is at a distance of 2.1 km from the plant area in south direction. National highway is at a distance of 3.2 km from the plant area in east direction. Divancheruvu west reserved forest is at a distance of 4.5 km in east direction, Divancheruvu east reserved forest is at a distance of 8.5 km in NE direction. There are no ecologically sensitive areas like national parks, sanctuaries within 10 km radius of the site [6].

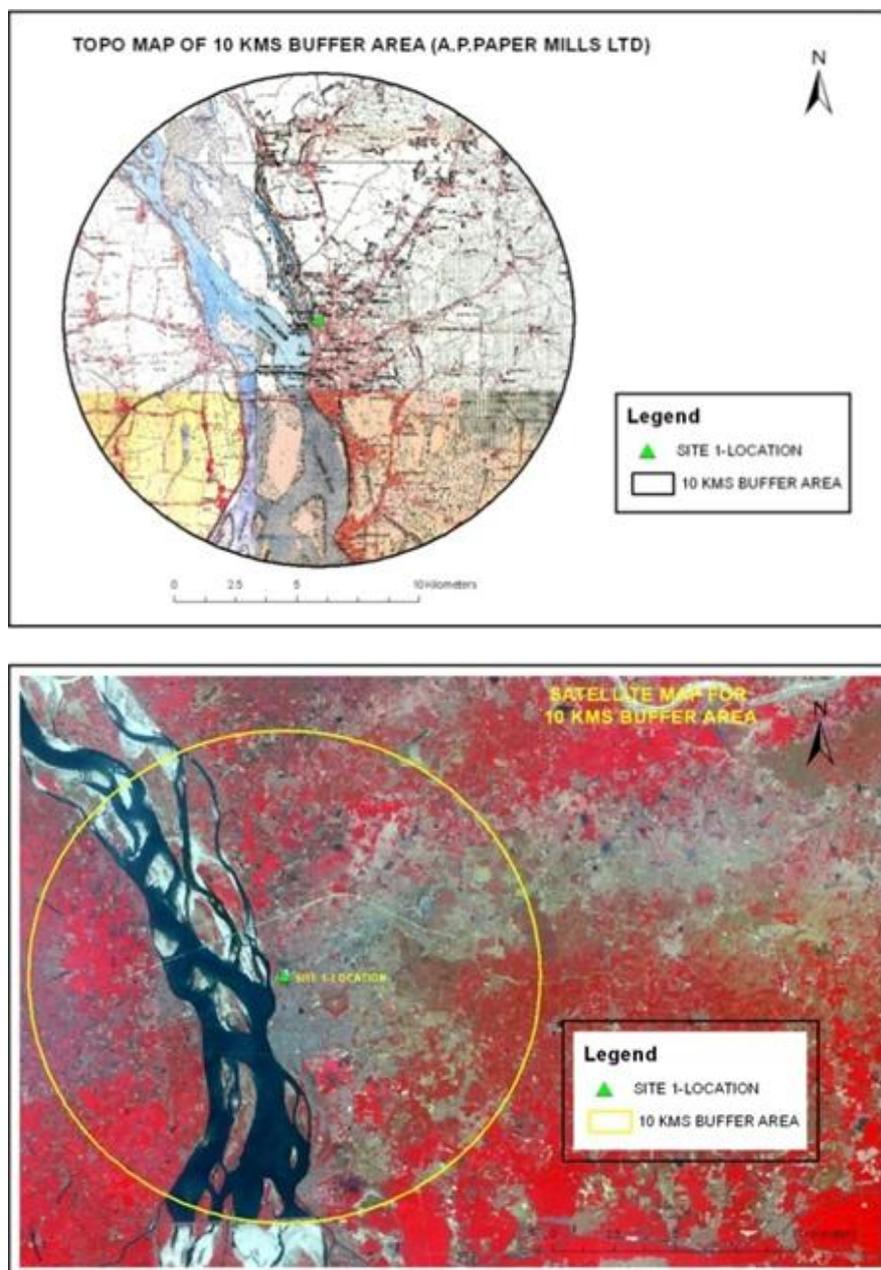


Fig 1: Showing the Topo Map and Satellite Date for 10kms Buffer area

#### 4. Objectives of the Study

The objectives of the environmental monitoring programme are: Evaluation of the efficiency of mitigation and pollution control measures

- Updating of the actions and impacts of baseline data
- Adoption of additional mitigation measures if the present measures are insufficient;
- Generating the data, which may be incorporated in environmental management plan in future projects [7, 8].

#### 5. Methodology

Monitoring methodology covers the following key aspects:

- Components to be monitored
- Parameters for monitoring of the above components
- Monitoring frequency
- Monitoring standards
- Responsibilities for monitoring
- Direct responsibility
- Overall responsibility
- Monitoring costs.

The proposed activity of the project, The Andhra Pradesh Paper Mills Ltd., involves processing of pulp and paper manufacturing, it is proposed to expansion of the pulp capacity by de-bottlenecking the process. Environmental monitoring of the parameters involved and the threshold limits specified are discussed below.

##### a) Ambient Air Quality (AAQ) Monitoring

Ambient air quality parameters recommended are Particulate Matter (Size Less than 106m) or PM10, Particulate Matter (Size Less than 2.56m) or PM2.5, Nitrogen Dioxide (NOx) and Sulphur Dioxide (SO<sub>2</sub>). These are to be monitored at designated locations starting from the commencement of construction activity. Data should be generated at all identified locations in accordance to the National Ambient Air Quality Standards location, duration and the pollution parameters to be monitored and the responsible institutional arrangements are detailed out in the Environmental Monitoring Plan.

##### b) Water Quality Monitoring

The physical and chemical parameters recommended for analysis of water quality relevant are pH, total solids, total dissolved solids, total suspended solids, oil and grease, COD, chloride, lead, zinc and cadmium. The location, duration and the pollution parameters to be monitored and the responsible institutional arrangements are detailed in the Environmental Monitoring Plan. The monitoring of the water quality is to be carried out at all identified locations in accordance to the Indian Standard Drinking Water Specification IS 10500: 1991.

##### c) Noise Level Monitoring

The measurements for monitoring noise levels would be carried out at all designated locations in accordance to the Ambient Noise Standards formulated by Central Pollution Control Board (CPCB) in 1989, Sound pressure levels would be monitored on twenty-four hour basis. Noise should be recorded at a. "A" weighted frequency using a "slow time response mode" of the measuring instrument [9, 10]. The location, duration and the noise pollution parameters to be monitored and the responsible institutional arrangements are detailed in the Environmental Monitoring Plan.

##### d) Responsibility of Monitoring and Reporting System

The overall responsibility of monitoring the above parameters shall be lies with the management of M/s The Andhra Pradesh Paper Mills. Ltd., the environment division shall be responsible for day to day monitoring of effluent, raw water and treated water quality. The Ambient air quality, Stack emissions, soil, noise and water quality shall be monitored by either third party or by the Environment management division of the unit. Records shall be maintained for the analysis of raw effluents and treated effluents, ambient air quality data, stack emissions monitoring results, micrometeorological data and noise levels. These records are not only required for the perusal of the Pollution Control Board authorities but also to derive at the efficiencies of the pollution control equipment as the objective of the project proponent is not only compliance with statutory regulations, but also a serious [11, 12] commitment towards clean environment.

The industry shall maintain the records as per the hazardous waste regulations and EPA regulations and apply for the annual consents for air and water, and renewal of authorization for the storage of hazardous waste as per Hazardous Waste (Handling & Management) Rules, 1989. The records of hazardous waste manifest will be maintained.

Reporting system provides the necessary feedback for project management to ensure quality of the works and that the management plan in implementation.

The rationale for a reporting system is based on accountability to ensure that the measures proposed as part of the Environmental Management Plan get implemented in the project.

#### 6. Conclusion

The paper mills have to take measures to reduce the use of natural resources. Waste papers was procured by the company for using its pulp in the manufacture of news print and writing and printing papers. Solid waste like wood dust can be used as auxiliary fuel in its coal fired boilers. Burnt lime will regenerate for re-use in the cooking liquor preparation. Effluents from company after treatments should be passed through land treatment system with soil water air matrix and sent to sand shoals. Company should installed chemical recovery plant to recover chemicals from the wastes generated. Emission of sulphur dioxide has to be reduced and its dependence on bio-mass fuel had been increasing. Waste water treatment and sludge treatment plants can be enhanced. Companies have to make efforts to reduce its carbon footprint. Flash heat recovery system has to installed as part of its energy conservation measures. Installation of modern energy efficient and environment friendly plants can improve the pulp production and fuel consumption and thereby reduced the cost of production. Company can installed turbine power plant to supplement captive power availability. Company has to involve in the farmers in planting more trees and water consumption was reduced year after year. The company's efforts on corporate responsibility will help in protecting and regenerating the natural resources. Towards its social commitment, company donated to charitable and other community developments purposes. Company's eco-friendly approach with farm forestry has to be continued [13, 14].

As far as the environmental impact of the paper mill is concerned, it is observed that there is no adverse effect on the agricultural productivity but as the distances from the mill increases the production decreases. This may be because of the fact that the waste water of the mill is treated and some

fertilizers like urea are mixed before disposal to the paddy fields. In case of health there is effect of the pollution generated by the mill which is obvious from the regression analysis carried out in study. To estimate the quantum of the health effect a detailed study is required.

Thus we may suggest one policy implication that in order to tackle with the problem of adverse affect of the paper mill's pollution on human health the pollution control standard is to be enhanced <sup>[15, 16]</sup>.

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