

ABSTRACT

In urban areas of India, there has been serious environmental deterioration during the last few decades, caused especially by industrial development. The environmental safeguarding measures presently adopted in urban areas could not be very much effective because of the presence of the small scale units and that too in the form of several agglomerations spread over the cities. The treatment facilities are not efficient, neither they are cost effective from the point of view of the scale of the firms. The industries are surrounded by residential areas where urban services are inadequate, which further aggravates the problems.

It has been felt that an in depth study on environmental problems faced by the urban industrial areas in India should be taken up for understanding the situations on one hand and on the other prescribing appropriate planning measures for arresting any further deterioration. Such a study has been carried out and it makes efforts in analyzing the trends in environmental planning and understanding the pollution discharges and their spreads and subsequently the nature of harms caused to the people. Finally, it aims at prescribing the preventive as well as corrective measures of pollution control and regulations so that the cities and areas subjected to pollution hazards are safeguarded from further degradation.

Analysis was done by studying two case areas in detail. Two pollutant types - air and water, which are most frequently encountered, have been analyzed with respect to the source releases, the spatial spreads of the pollutants, the population coming in contact and the health harms. For air pollution spread analysis the Gaussian Plume method was adopted and for understanding the water pollution spread in ground water the Theory of Fluid Flows in Porous Media was applied. Applicability of both the methods was tested through validation. From literature the likely health damages due to the presence of

pollutants could be understood. The damages were confirmed through household health surveys and opinions of the doctors in the surroundings of the two study areas.

It is observed that the pollutants in air spread in a pattern which is largely governed by the locational distribution of the sources and the wind flow characteristics. Depending upon the pattern of spread and the duration of pollutant deposition at any particular location, the nature of health damage has been seen to be varying at different locations in the surrounding areas. In the case of wastewater, many conservative pollutants are known to be discharged on land or in unlined channels and subsequently, they get mixed with ground water. Being non-degradable, the water pollutants get accumulated over a period of time and also under the action of the ground water flow are dispersed over large areas. In the absence of protected water supply, the inhabitants in the surrounding areas consume the contaminated ground water. People in the surroundings are showing indications of health damages due to air and water pollutants. So far there has been little effort towards strict control over residential density or for creating provisions for green belts and buffers, which would have protected people from contact with pollutants.

The harms that have been identified are an unintended offshoot, while the real motive of the industrial units is to generate social and economic benefits. Therefore, in order to avoid giving a biased opinion on industrial pollution and the related problems in urban areas, efforts have been made to analyze the social benefits accrued by industries. The social benefits are evaluated in terms of availability and level of provision of facilities

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miscellaneous benefits. infrastructure, housing~~

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employment, pollution spread, sensitivity of environment, degree of damage by any individual pollutant and population in affected zones. By application of the impact determination method the damage levels due to individual pollution types as well as the combined effect of both the pollutants put together have been known. It is seen that the characteristics of the environment and the nature of pollutant parameters vary the impact degree. Through application of the index one can point out the difference in the damage as well as the gravity of harm at each of the locations.

Through such understanding of the types of benefits and harms and their respective levels, a conceptual model for environmental planning for urban industrial areas has been arrived at. This model identifies the possible causal factors and incorporates the feasible planning tools and their inter-linkages, the likely changes in environmental conditions and hence the alternatives for actions.

The causal factors are - locations of sources, source control inefficiency, raw material, production process and fuel used, concentrations of pollutants discharged, nature of discharge, the type and characteristics of the medium, type and mode of contact with pollutants in residential areas. The harms of the pollution released can be lowered by adopting planning tools such as reduction in pollution concentrations at source, appropriate location of industries and residential areas, appropriate waste discharge methods, suitable land use, provision of green belts and buffers zones and control of density. Various agencies that can help in pollution control and regulation are also identified. By use of impact index, the alternative locations could be identified and the priority for actions at different locations could be determined.

Since different causal factors will be acting simultaneously on the environment in any real life situation a combination of several planning instruments needs to be applied simultaneously.

Also there will be exogenous economic and technological factors that will govern the type of industries, the pollution control measures and the nature of health damages. Therefore, the planning instruments too will vary at different points of time. A set of general guidelines derived through the generic model of environmental planning are given. The guidelines concentrate on control and regulation of air and water pollution problems. A set of guidelines are given based on the analyses of combined impact, done through the index. These guidelines have been put forward, considering planning instruments including the agencies that can help in implementation of various actions. Various social actions towards creation of awareness for prevention from health hazards have also been suggested as self-defense by masses. Finally, recommendations for case study areas are given along with an indication on the priority of the actions.