



ANALYSIS

# Impact of water pollution on rural communities: An economic analysis

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## Abstract

This paper assesses the economic costs of water pollution (industrial) in the rural communities in terms of losses to agricultural production, human health, and livestock. The cost estimates are based on the detailed primary (household level) data collected from an intensive study of two villages—one a pollution-affected village and another control (not affected by pollution)—located in one of the industrial belts in Andhra Pradesh, South India. The cost estimates revealed that the impact of industrial pollution on rural communities is quite substantial in monetary terms. The paper argues that the compensation principle might work if the estimates of damage are realistic. Further, mere passing of laws and creating institutional structures are necessary but not sufficient to address the environmental problems. Policies should be implemented in their right perspective. Institutions should be strong enough, with more autonomy and powers, to deal with the problems at hand. © 2005 Elsevier B.V. All rights reserved.

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## 1. Introduction

An important dimension of water resources that has not received due attention is its quality aspects. The rapid industrialization in developing countries, though contributed to economic development, has

resulted in heavy losses to economic welfare in terms of effects on agricultural activities, human health and ecosystem at large through air and water pollution. Basically water pollution poses a serious challenge due to its impact on a large number of economic activities. The problem of water pollution acquires greater relevance in the context of an agrarian economy like India. While the magnitude of the problem is limited and widely spread, the losses due to its impact are quite substantial. This is mainly due to its direct impact on human health and livelihoods.

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Though there are a number of empirical studies on agriculture related environmental problems, such as soil degradation, wind and water erosion, only a few studies have dealt with environmental problems associated with industrial pollution and its impact on agriculture and other sectors. Though at the macro level Pearce David and Warford (1993) have estimated the costs of environmental degradation in terms of human health, soil erosion, deforestation, etc., majority of the indicators are not directly related to industrial pollution. It was shown that the damage costs in developing countries are higher than those in developed countries (Pearce David and Warford, 1993). According to their estimates the environmental costs in the developing countries were about 5% of their GDP.

A few studies have dealt with the impact of industrial pollution on agriculture, human health and ecosystems in the developed countries (Pearce et al., 1978). Pearce David and Warford (1993) have argued that the most important and immediate consequences of environmental degradation in the developing world take the form of damage to human health. Yonggua et al. (2001) have made an attempt to estimate the impact of industrial pollution on agriculture, human health and industrial activities in Chongqing, which is one of the heavily polluted mega cities in China. It was estimated that the total costs of industrial pollution were 1.2% of Chongqing's gross product. Of this 56% is in agriculture sector, while the damages to human capital and industrial sector are 20% and 18%, respectively. These studies reveal that industrial pollution imposes severe costs on other related sectors in an economy.

In the recent years, attempts have been made in India to estimate the various impacts of industrial pollution and sewage on human health, agriculture and livestock and other sectors of the economy (Shankar, 2001; Dasgupta, 2001; Murty et al., 1999; Markandya and Murty, 2000). However, in most of these studies estimates are made on the basis of single reference point. They have not taken into account the changes over the period or compared the affected situations with that of a controlled situation. This study is an attempt to estimate the costs of industrial pollution on various aspects of rural livelihoods in a systematic manner. Such an approach assumes importance in the context of policy formulations. Besides,

the study region provides a unique opportunity to understand the policy dynamics due to the active involvement of the civil society, judiciary and other stake holders in the process of sorting out the problem. For that reason, policy interventions have already been made in the study region to address the problems without much success. In fact, following an agitation by the local communities a judicial committee after enquiry has come up with a compensation package to the rural household, which was rejected. This study would help us to understand the reasons for the policy failure.

This paper makes an attempt to estimate the costs of industrial pollution with a focus on the environmental impact of water pollution on the rural communities in general and on agricultural production, human health, and livestock in particular. Some of the important issues in this regard are as follows: (a) linkages between the industrial development and changes in micro (local) environment, (b) damage to crops, livestock and human health in the rural communities due to pollution, and (c) understanding the reasons for the policy failure in addressing the problem. These issues are studied in detail with the help of primary (household level) data collected from an intensive study of two villages—one a pollution-affected village and another a control village (not affected by pollution) located in the industrial belt near Hyderabad, the capital city of Andhra Pradesh State.

The paper is organized in four sections. Section 2 discusses the data used and the methodologies adopted in the study. Based on the data analysis, impact and valuation of the damages due to pollution are estimated in Section 3. The last section narrates the policy failures and options in correcting the problem.

## 2. Data and methodology

The study region falls in the Patancheru, Jeedimetla and Bollaram industrial regions of Andhra Pradesh (Fig. 1). People living in and around these industrial estates have suffered damages in terms of losses to crops, cattle and agricultural equipment such as pump sets, contamination of drinking water, diseases and deaths due to water pollution. In Jeedimetla and

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