

## **REGIONAL RURAL DEVELOPMENT IN PUNJAB PROVINCE: AN ENVIRONMENT-BASED APPROACH FOR GUIDING DECISIONS ON INDUSTRIAL LOCATION**

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### **Summary**

The way industries are located in a region has profound impact on its environment. Urban and regional planners have been mostly concerned with locating industries for economic development. Environmental Impact Assessment (EIA) has been their main tool for dealing with environmental issues related to industrial locations. Even the new glorified form of EIA, Strategic Environmental Assessment (SEA), is for evaluating plans and programs and not a theoretical approach that could form the basis of policy formulation for industrial locations. This paper presents a new approach that attempts to determine the types and volumes of industries that may be allowed in different parts of a region without stretching the natural environment beyond its limit. The new environment-based approach is meant to be for developing countries and its application has been demonstrated in a case study of Punjab Province, Pakistan. Using the understanding of Planning Support Systems and the conditions in the study region, the environment-based approach was translated into a methodology having four modules. The first three analytical modules cover three important aspects of regional planning

(land, water, accessibility) and are a fair cross-section of current techniques (GIS-based overlay methods, hydrological modeling and location/allocation methods). The fourth and last module sheds light on the policy and planning implications of the findings of the three earlier modules of the methodology.

## 1. Introduction

The theoretical approaches to industrial locations can be categorized into two groups; the ones that are concerned with the benefit of the entrepreneurs and the ones that are welfare-oriented. Even when welfare is looked at, economic issues of income and employment are the main concerns. There has been a need to develop an approach that could help governments formulate an environment-based industrial location policy for a region: a policy that gives environment the first priority, which fits well with existing regional development policies and local land use planning, and gives private entrepreneurs as much freedom to choose locations as possible. This new approach has to be based on the understanding of the kind of pollutants industry discharges, how industrial pollutants interact with the natural environment (soils, ground water, surface water), what industrial pollutants can do to the natural environment / people, how these pollutants can be treated and how they can be modeled. This approach is described below.

The new approach involves a thorough understanding of the environmental conditions in a region and possible damage that discharges from different categories of industries can do to the environment in that region. Based on this understanding the next step in this approach would be zoning of the region for *excluding* certain industries from certain areas. Another important element of this new approach has to be determination of pollution assimilative capacities of water, air and land. This knowledge will help in *limiting* the discharges from industries or even industrial volume itself. This information is also necessary if economic instruments of pollution control have to be used. The next component of this approach is finding the locations of maximum social benefit in backward areas of the region for *luring* industries there. *Translating* all findings into policy measures is an integral and concluding part of this new approach. This new approach is to be strategic in nature.

## 2. The Environment-based Approach and Strategic Environmental Assessment (SEA)

The environment-based approach presented in this paper is mainly a discussion in the industrial location discourse. However, it is related to the Environmental Assessment (EIA and SEA) discourse as well. The approach presented in this paper can be considered a step above SEA—something at policy level, something on which policies are based. This work can simplify SEA at plan and program levels, as SEA simplifies EIA at the project level.

In 1999, a workshop of experts in Environmental Assessment held in Cape Town concluded that, internationally, SEA is not applied at the policy level. It is mostly applied at plan level. The workshop further found that SEA could reach policy level but it should first be further developed at the plan and program level. A number of

researchers have pointed out that SEA experience tends to have been at the level of programs and plans, where EIA procedures and approaches can be applied fairly readily. SEA here can be seen as an extension of EIA to facilitate strategic decisions.

Experience to date has shown that it is easier to apply SEA to those programs, plans or similar initiatives that have a direct relationship to projects. It is not particularly difficult to apply a revised version of the approach and the methods derived from project-led EIAs to such actions. SEA should greatly reduce both the numbers and scope of EIAs that need to be carried out at any stage of the planning process. Experts in environmental assessment have highlighted that, for each project, an initial study would be conducted to determine which environmental impacts of the project were adequately addressed in the SEA; those aspects addressed in the SEA need not be re-addressed in project EIA.

There is a second way in which the new environment-based approach can be seen in relation to SEA. It is what SEA was supposed to be: as a tool for environmental sustainability at policy level. Some researchers have noted that the use of SEA as a sustainability assurance (rather than impact minimization) mechanism may require adjustments to SEA. SEA must focus on environmental bottom lines to stay within source and sink capabilities of nature. It must also avoid the loss of irreplaceable and high value environmental stock by determining the acceptability of impacts. And as pointed out in a workshop on SEA in Cape Town, currently SEA is more of a philosophy/way of thinking than a reality.

The problem with EA (EIA and SEA) is that they react to development proposals rather than anticipating them. SEA is a step in the right direction but it is not enough. Intentions behind it are good but in its current form it is too much in the shadow of EIA.

A third important point is that literature on EA often mentions that SEA places environmental concerns on equal footing with economic and social aspects. This author tends to believe the environment ought to get precedence over other sectors. Limits of the environment ought to determine limits of our economic exploitation. Our life, our survival depends on the environment. Our planning has to be ecologically based.

### **3. The Case Study Area: Punjab Province**

Pakistan is located in South Asia. On the basis of geological and topographical conditions, it can be subdivided into two parts on a north-south axis. Most of the eastern part of the country is flat and is drained by the river Indus and its five major tributary rivers. This region (also called the Indus plain) generally constitutes the provinces of Punjab and Sindh. The upper part of the Indus plain, which constitutes the Punjab province, contains the highest concentration of the country's population. It contains most of the productive agricultural land and many major urban areas (see figure 1).

Punjab province, with its population of more than 72 million people and land area of 200 000 km<sup>2</sup>, is divided into eight divisions. The four divisions of Lahore, Gujranwala, Faisalabad, and Multan form the core of the province. These divisions cover only one third of the land but contain two thirds of the population of the province. Most of the

industry of the province is located in these parts. The remaining four divisions, Bhawalpur, Dera Ghazi Khan, Sargodha, and Rawalpindi, are socioeconomically backward, less densely populated, and have little industry.



Figure 1. Punjab Province: the study region

Punjab has a continental climate, which is very hot in the summer with temperatures of up to around 46 degrees Celsius, and very cold in winter with near zero temperatures. It is semi-arid with very little rainfall. The province has five rivers, the Indus, Jhelum, Chenab, Ravi and Sutlej (the word Punjab means five rivers). These rivers originate from mountains in Kashmir and are mainly fed by water from melting snow. These rivers provide substantial surface and ground water resources and fertility. About 50% of Punjab's land is cultivated using water from these rivers as well as the ground water. These water resources are also the source of potable water for people within the densely inhabited province. In short, water resources are the single most important natural resource of the province.

The rapid growth of Punjab's cities and industrial areas has been insufficiently planned. Raw sewage and urban solid waste are dumped in drainage channels, local streams and rivers. Inadequate or poorly enforced controls allow factories to dispose of their emissions and waste products without regard for their effects on Punjab's air, water and soil resources. The degree of pollution in the natural streams is becoming critical. E.g. the river Ravi near the city of Lahore has become so polluted that hardly any oxygen is

found in the water during the low flow winter season which has led to the disappearance of all aquatic life.

Punjab Province is densely populated and is growing fast. The industrial sector is getting encouragement for growth from governmental for employment creation. This encouragement will increase in future with increase in population pressure. Also continued political and ethnic violence in Karachi is forcing many industries to shift to Punjab. The industrial sector is thus likely to grow fast in future. Many parts of Punjab Province are facing serious environmental problems. The river water quality in places is so bad that all aquatic life has vanished. There is a need to know where future industries should go so that their environmental impact is low.

#### 4. Methodology of the Study

Considering the environment-based approach described earlier on, the methodology of the study was formulated. The methodology put forward makes use of scientific methods and computer tools to come up with rational and transparent policy recommendations. This methodology has four modules: (1) zoning of the province for different categories of industries based on their compatibility with the biophysical conditions using GIS as a tool; (2) determination of permissible magnitude of industries for different sub-areas so that the waste discharges are within the assimilative capacity of nature (for four core divisions); (3) determination of the locations for attracting industries for achievement of social and equity goals (for four peripheral divisions); (4) elaborating the ways and means of interpreting, integrating and operationalizing the findings of modules 1,2, and 3.

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### **Biographical Sketches**

**Awais Piracha** is a lecturer in Environmental Planning at the School of Construction, Property and Planning of the University of Western Sydney. He received his education in environmental engineering and planning from Australia, Germany and Japan. His research focuses on the analysis and solution of environmental problems faced by Asian cities and regions. The specific areas of his research interests include: urban ecosystems, computer applications in environmental planning, planning support systems, environmental planning and management for regions and cities in Asian countries. Piracha has taught or undertaken research at the Civil Engineering Department at King Fahd University of Petroleum and Minerals, Saudi Arabia, Asian Institute of Technology, Thailand and the United Nations University, Japan. His research findings have been published in a number of international journals.

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