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ANALYSIS FOR RESIDUALS—ENVIRONMENTAL QUALITY MANAGEMENT: A CASE STUDY OF THE LJUBLJANA AREA OF YUGOSLAVIA

by
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The notion of materials balance for environmental management put forth by Ayres and Kneese¹ has seen a number of increasingly sophisticated applications. For example, the work of Russell, Spofford, and Kelly at Resources for the Future on the Delaware estuary has explored the tradeoffs in residuals management for air, water, and land in depth.² This work, while providing important policy insights, was, however, methodological in nature—using both the most sophisticated natural systems models available (including a non-linear aquatic ecosystem model) and elegant economic analysis to find the least cost policies for obtaining given ambient levels of environmental quality. As such, this previous research provides a benchmark in the analysis of regional environmental quality management. One might ask, in this light, what is the role of this new RFF study? In reply, this research merits serious attention because the Yugoslavian (as opposed to urban American) situation, which is the focus of this new study, provides a richly different setting for environmental analysis.

Decisionmaking in Yugoslavia is highly decentralized, with resources allocated at the commune level (similar to U.S. counties) by worker-management committees. Thus, funds for environmental protection are not available from the central government which only provides environmental guidelines. Also, the Ljubljana area of Yugoslavia, the study region, is now undergoing rapid urbanization with consequent environmental problems of air pollution, water quality, and solid waste disposal. The setting is one where effective institutions for coordination of environmental management do not yet exist but where environmental problems are just developing, so the opportunity for effective management—and the opportunity to use the results of such a study—are very great. However, Basta, Lounsbury,

1. See Ayres & Kneese, *Production, Consumption, and Externalities*, 59 AMER. ECON. REV. 3 (1969).

2. The most complete statement of this research effort is contained in W. SPOFFORD, C. RUSSELL and R. KELLY, ENVIRONMENTAL QUALITY MANAGEMENT: AN APPLICATION TO THE LOWER DELAWARE VALLEY," (RFF Research Paper R1, 1976).

bury, and Bower have eschewed the most sophisticated elements of both economic and natural systems analysis (analysis of the generation of regional ambient concentrations of various pollutants). Rather, they focus on institutionally feasible or acceptable strategies such as end of pipe sewage treatment as opposed to changing industrial processes to reduce BOD loadings. For the most part, environmental strategies analyzed are those under consideration or proposed by local officials. These are compared to find the least cost combinations to achieve environmental goals, which are often simply specified as emission reductions rather than ambient concentrations. The authors are overly apologetic and defensive for these simplifications since the research provides valuable and sometimes counter-intuitive insights. For example, conversion to central or block heating of residences turns out to increase ambient SO₂ concentrations. Improved management policies also are suggested: as the region converts to central sewage treatment facilities (no treatment now exists) an optimal ordering exists for connecting first those dischargers that are the worst polluters or nearest to the proposed treatment plant; also the use of high quality solid waste landfill systems appears to be uniformly justified.

The merit of the study lies in its demonstration of how, with a limited research budget and data base, the concept of materials balance can be utilized to identify effective (least cost) and practical environmental strategies. The authors have provided good advice for environmental management in Yugoslavia including limited discussion of institutional arrangements. However, the real value of the study lies in its demonstration of practical use of the tools of environmental management.

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