

airports) and in government, non-profit and public services (e.g., the military, education). Chapter Ten concludes the study, followed by more than 50 pages of appendices (mostly data).

The conclusions are both refreshing and of practical value, particularly for those readers who (like this reviewer) do not accept many of the over-simplifications which abound in the literature on urban systems. Economic change is shown to be complex and highly varied. The immense importance of the expansion of public sector activities and government employment in stabilizing urban growth is also demonstrated.

Although the book is thick, cumbersome, and often difficult to read, anyone willing to plough through it will find much of value. The relative absence of theory, the limited statistical analyses and the now-dated information base (ends in 1976), all reduce the impact and relevance of the book. Even so, it provides a thorough accounting of economic trends through the booming 1960s and volatile 1970s on which subsequent studies can build. Ironically, in the early 1980s the economy solved the question of why some cities are growing and others are declining by reclassifying almost all of the country as "in recession."

One outstanding question, which the authors refer to but do not address, is why some older cities with rapidly declining basic sectors, have been able to adapt their economies internally to meet the new economic realities while others have not. Clearly we also need more in-depth longitudinal studies of local economies and labor markets. Key Words: *economic restructuring, U.S. urban system, producer services, corporate complexes*. L. S. Bourne, University of Toronto.

Normal Accidents: Living With High-Risk Technologies. CHARLES PERROW. New York: Basic Books, Inc., 1984. x and 386 pp., index and biblio. \$21.95 cloth (ISBN 0-465-95143-X).

For the science of hazard, particularly technological hazards, a fundamental but deceptively simple question asks: Why is it that technology designed to help people hurts people? Charles Perrow, an organizational sociologist, provides a two-tier answer.

Most technological hazards arise out of *component failures* of the DEPOSE (design, equipment, procedures, operators, supplies and environment) system of a technology. But some technologies are hazardous, not because of the failure of a component, but because of *system failure*, where multiple failures occur, because components have interacted in unexpected and often incomprehensible ways. When the technology has catastrophic potential—release of toxic vapors, explosive reactions, large populations exposed, or major ecological change—the society faces disasters. And as technological systems become more complex and their components more tightly coupled, systems failures become inevitable, thus the title characterization of the "normal accident."

Beginning with a homey "coffeepot paradigm" of a system failure to get to a job interview on time, Perrow moves on to a series of chapter-length examples. These are: nuclear power, a system just waiting for more and worse Three Mile Island-type failures; petrochemical plants, a pre-Bhopal estimate as a system better-run than nuclear; aircrafts and airways, a managerial success story of reduced failure; marine accidents, a horror story of an "error-inducing" system; ecosystem failures of dams, quakes, mines and lakes; and a high-tech trinity of space, weapons, and DNA technologies. Interspersed is a theoretical and definitional chapter, a quick critique of risk assessment and decision-making, a brief organizational perspective on high-risk technologies, and a proposal to ban the nuclear bomb and power plant, to restrict the use of DNA and marine transport, and to tolerate most everything else.

At the heart of these analyses and recommendations are three dimensions: complexity, coupling, and catastrophe. Systems that are complex as opposed to linear, in which materials transformation rather than fabrication takes place, and are tightly coupled with time-dependent, invariant processes and little slack, are particularly prone to system rather than simple component failure. Where many third party victims are exposed to the failure, the catastrophic potential is high.

Perrow writes gracefully and clearly. Intended for a lay audience, it is a stimulating volume for the hazard scientist with fresh concepts, thick description, and a different disciplinary perspective. For this hazard scientist, complexity, coupling, and catastrophe are an interesting, thoughtfully discussed, hypothesis. But the absence of clear criteria for measuring complexity and coupling make his many examples seem anecdotal, inconsistent, and subjective, limiting its usage in the growing effort at hazard taxonomy as a way of ordering and simplifying the

hazard domain. Nevertheless, this volume, once read, will forever color the way one reads accident reports—the accidental becoming the expected; the unusual, the norm. Key Words: *technological hazard, system failure, complexity, catastrophe*. **Robert W. Kates**, Clark University.

Vanishing Farmland: A Legal Solution for the States. SARAH E. REDFIELD. Lexington, MA: D.C. Heath and Company, 1984. xv and 197 pp., index and biblio. \$28.00 cloth (ISBN 0-669-08233-3).

The author of this book is a lawyer, the reviewer is an economist, and the intended review audience is professional geographers. Is there some commonality of professional interest in a book on “vanishing farmlands”? I think the answer is yes, especially if you are involved in any degree with the questions of land settlement patterns or farmland preservation.

Vanishing Farmland is a relatively short book, with a substantial portion of its 197 pages devoted to endnotes, a model ordinance, and a “Table of Authorities.” The text consists of just four chapters, but in those chapters the author presents a remarkably cogent, concise, and even-handed analysis of the case for a regulatory program for farmland protection. The heart of the book is Chapter 4, which presents a proposed model statute for agricultural land protection. The statute is based on three premises: (1) There is a need to address the loss of agricultural land, (2) a regulatory program to achieve this objective can be legally defensible, and (3) a regulatory program can be structured to be practically useful to both farmers and the community at large.

Redfield recognizes that each of these premises is subject to debate. Chapter 1, for example, reviews the factual basis for governmental interest in agricultural land. The chapter draws heavily on the National Agricultural Lands Study (NALS), which concluded that there was serious need to protect agricultural land. However Redfield recognizes and gives equal credit to the extensive criticisms of both the data and conclusions of the NALS. Chapter 1 also critiques traditional land use controls and early judicial precedents to protect agricultural land.

Chapter 2 discusses the model statute in light of the frequently asserted objection that it is unconstitutional to regulate agricultural land so as to deprive the owner of his or her right to sell it for development. Redfield considers judicial interpretations of the constitutional provisions that may constrain farmland preservation programs and concludes that a program can be designed to withstand constitutional challenge.

Chapter 3 summarizes and evaluates some recent regulatory and voluntary programs that have been used by state and local governments to protect agricultural land from conversion. This is a useful summary of the “state of the art” in farmland preservation programs.

As a non-lawyer, I cannot comment on the adequacy of Redfield’s analysis of the judicial and constitutional parameters of agricultural preservation programs, nor on the ultimate effectiveness and survivability of her proposed statute. Nevertheless, I believe anyone involved in farmland preservation issues will find this book useful. Key Words: *farmland preservation, model statute, regulation*. **Robert F. Boxley**, Economic Research Service, U.S. Department of Agriculture.

Applied Methods of Regional Analysis: The Spatial Dimensions of Development Policy. DENNIS A. RONDINELLI. Boulder, CO: Westview Press, 1985. xviii and 264 pp., maps, diags., index and biblio. \$25.00 paper (ISBN 0-8133-7022-1).

Dennis Rondinelli has been contributing to the literature on spatial development planning for over a decade. In particular, he has been concerned with the role of small and intermediate size cities in the development process. Hence, it was most appropriate that he be called upon to evaluate the contributions made by the Urban Functions in Rural Development (UFRD) project initiated in 1976 by the U.S. Agency for International Development. The major aim of UFRD was to introduce spatial analysis into regional development planning in the Third World. This book, in particular, draws on Rondinelli’s experience in the Philippines and Bolivia; the objectives appear to be both evaluative and expository and there is an acknowledgement that the UFRD approach is controversial.

In the first chapter, the author lays out the fundamental assumption that if governments in

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